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Perception the Rainfall Series through the Population the Palma City in the Period of 1984/2013

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Abstract

The present study is based on the perception of the human population on the island of Majorca (Spain), mainly in the capital of Palma. The event to consider is the perception and reality of the phenomenon of rainfall. The main objective of this work is to distinguish the dichotomy between the percepction subjective personal and objective reality climate. The climate is important in the economy of the Balearic Islands in the sectors of tourism, environment, outdoor recreation and agriculture. The methodology consists of interviews, climatic series and statistical analysis. The surveys are based on aspects of spatial, temporal and quantitative rainfall. Rainfall is variable at different scales of days, months, seasonal and annual. Statistical analysis shows the results between human knowledge and climatic series. Sometimes there is disagreement between the myths and the real climate, while other times such myths which occur are perceived. The results support that perception is different from reality. It is important to state that our perception of climate depends on our prior information and knowledge of the physical environment and its study is essential to investigate climate change.

Keywords: climatology, meteorology, rainfall, perception, climate change

1. Introduction

This study seeks climate perception on the island of Majorca (Spain). It is necessary to note that these works are aware of our perception and of the reality in the physical environment, both influences on our daily activities. The theme is based on the geography of perception that began in the decade of the sixties in America for the autor Kewin Lynch (1960), projector geography of perception in the US with the book "The image of the city."

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In the case of this article, the phenomenon to be analyzed is the rainfall, the reason is becouse it's an important climatic phenomenon and also as events are very popular among society of the Balearic Islands. On the island there are variabilities in tipologies that influence in the rainfall, the different geomorphology and prevailing winds has particular pattners for areas, the observation in the paper can establish correlations between popular perception and scientific knowledge. Over recent years, climate perception has been studied in various countries, treated in the perception of tourists, farmers, sports, in outdoor activities between experts and the physical environment. For these reasons it is appropriate to treat various economic sectors of the population, who have been here longer linked to climate phenomenon of precipitation. There are diverse background in studies of climate perception. In Mallorca, Alomar G, et al, (2007), is the perception of sea breezes, In Spain, the perception of urban climate studies (Martin V, 1990, Lopez F, 1995, boats I, 1995, Lopez A 1995), as well as the perception of drought in the Spanish Levant, (Alberola a, 1996). In northern Europe, the perception of climate change is studied (Eliasson et al, 2007, Bryce and Frank, 2014, Pennesi et al, 2011, Forland et al, 2013, Andrade et al, 2011), also studied the perception of climate change with the tourism (Denstadli et al, 2011, Falk M, 2014). In agriculture, have studies in Africa (Nii et al 2014) and Argentina (Bethlehem and Field, 2008). In US climate perception is present in multiple studies (Balling and Cerveny, 2003), (Changnon et al, 1971) and (Van and Grady, 2014).

When work has been useful to try to create a methodology consistent with the hypothesis, through surveys in society, with popular questions on precipitation, as in the example, Does it rain more in the field or in the city? o What day of the week or month rains more ?, with these simple questions, the subjective perception of climate extracted to Majorca. In contrast, with the help of statistics of precipitation in Palma series, the two views, popular belief and statistical and scientific rigor are compared. So the results show if we have sufficient knowledge about our physical environment and our perception is distorted if the climate reality. Thus, we consider the myths, misconceptions and realities of precipitation in the island. The causes of distortions of the correct perception of reality are influenced by the media, poor climate knowledge, little adaptation to the physical environment, different weather situations experienced, the age and experience of the observer. According Vide (1990), the features of subjective perception dependent lifestyles, place of residence and social situation. As our perception is conditioned by the profusion of media. The above features make patterns, references, milestones and climate values of subjective knowledge.

The study comes on the field in the perception of historical climate and future climate change. In which, the results contribute to our knowledge a willingness to tackle global change phenomena, in this case are the rainfall regimes in which various studies, claim that climate change will produce significant climatic fluctuations. Some scientists predictions relate that the rains will be more intense, increase temperatures in the northern countries, there will be increases in droughts in southern countries, all this leads to modify the synergies of economic activities countries, ranging gradually its links with the natural and urban environment, causing changes in global dynamics. Climate change may cause possible global changes, such as the population migrations in India (Ramachandran K and P Susarla, 2011) and Nepal (Manandhar et al, 2011). Changes in tourist destinations in Scandinavia (Denstadli et al, 2011) and Martinique (Hübner and Gössling, 2012). Changes in rainfall in Norway (Forland et al, 2013) and the African city of Accra, (Codjoe et al, 2013). This study shows our mistakes against climate change, being beneficial to know their behavior, to establish prevention policies against climate risks which arise in the future society.

2. Study Area

The location of the studio is on the island of Mallorca (Spain). Specifically in the capital, Palma, with 398,162 inhabitants (2013, INE), with an area of 208.63 km2, located south of the island in the Bay of Palma. The reason for the choice of this place is due to most of the inhabitants of the island, living in Palma, where lives 46% of the population and Palma is the greatest city of the Balearic Islands. For the study, two series, the port and the city airport are used. Between the two places are 10 kilometers away and located at the same latitude. The first season, Porto Pi, is located at the Meteorological Center Balearic Meteorology Agency (W 39º 33 '7 "E 2º 37' 18.2") and 3 msm, in an urban area west of center city, high population density, building height, high port activity and vehicles traffic and some surrounding areas with hills. The second weather station at the airport, (W 39º 33 '39 "E 2 ° 44' 12.1"), and 8 msm, is located east of the town, in a country setting, with low population density, few buildings, air activity and plain topography. Also, places of residence of respondents have been mixed, mainly Palma and its surrounding municipalities, and others municipalities of the Serra de Tramuntana, the Pla de Mallorca and Levante Insular.

Figure 1: Location Map of the Study Area

Map scale 1:100000. City of Palma of Majorca. Meteorological stations used, dichotomy between urban (Porto Pi) and rural (Airport) areas. The distance between the two reference points is 10 kilometers

Climate of Mallorca, is classified as Csa for Köppen, is a climate of middle latitudes, with atmospheric circulation west, typical Mediterranean with warm summers. The variability of precipitation in Majorca varies depending on the location between 1200-300 mm and 50-100 days per year (Jansà A, 2014). Rainfall on the island, are mainly produced by different climatic factors. DANA's or cold drops, typical of autumn, the heaviest rains caused by the contrast of cold air aloft and high temperatures of the sea. The depressions south and southeast of Majorca, develop warm, moist easterly winds, rainfall persistents.

Depressions located in Corsica and Sardinia and Ligurian Sea airflows send gregal, with favorable rainfall conditions. Atlantic fronts create instability on the island, which are associated with the rainfall. The effect of breezes toward the center of the island with convective air flows, develop large cumulonimbus, with intense discharges in short periods of time, usually the summer months. The city of Palma, is exposed to all prevailing winds of rain, except Tramuntana, where the winds come modified by the foehn effect, in the lee of the Sierra de Tramuntana.

3. Methodology

The methodology consisted of two phases, the phase of the phase surveys and statistical analysis.

3.1. Surveys Phase

To know the perception of the population on precipitation, has conducted a survey model Delphi with 12 questions, including three personal respondent. The three first questions are place of residence, age, sex and years of residence in the island of Majorca and other 9 questions are purely weather. The questions are as follows, (the day of the week with more rain, the place where it rains more in the field or in the city, the month and the rainy season, the less rainy month, how many months has been no rain, how much rain a year, if it rains today than before and also if in the future more rain today). These questions have been selected from other multiple previous questions related to the perception of rain on the island, being intended for the public in general has tried to be as clear and concise as possible, in such a case has been made screening collaboration with the SOMIB, Observer Meteorological Society of the Balearic Islands. The sample obtained was n = 102 respondents, the whole island of Mallorca, 62% were from the city of Palma, the rest of the foreign part of the capital. 70% of respondents living on the island for over 25 years. Surveys have been made through software "google drive", sending the survey via email, with questions answered online and collected in an Excel file for further analysis.

3.2. Statistical Phase

In the statistical analysis, were obtained climatic series, Meteorological Center and the Son Sant Joan airport. Sources of records have facilitated the Territorial Delegation of the Meteorological Agency and the Department of Earth Sciences at the Universitat de les Illes Balears. The series of urban precipitation have been used Meteorological Centre, CMT (1984-2013) for months and CMT (2013), for days. The series of field has been employed Airport for months (1984-2013). To set the two locations has used the principle of Lowry (1977), which states that to be comparable, the measurement points should be located at a similar altitude, distance to the nearest water bodies, topography, etc. It must also meet the peripheral point not register variations of external meteorological phenomena, as can be downwind of a city. The distance between the urban and the airport is 10 kilometers field, located at the same latitude. The port and the airport is located to the west respectively and east of town. In the series and results, working scales are daily, monthly, seasonal, annual and interannual. Explicitly, we have computed both the values of daily precipitation of 2013, as the values of the months for 30 years.

In the two series of Palma there are no data gaps. All the months and days have value as a record, so it has not been used a method to establish the computation of expected values. The variability and noise of the series is high, due to the particular series of alternating events no precipitation rate, average and extreme rainfall. Was performed using the software spps test of paired t test, to see if the series the port and airport are correlated, the significance is 0.000 and the correlation of 0.91. So are two series are jointly may apply statistical analysis. In the statistical treatment of the series, to develop percentages, means, variances and predictions have used different methods. At the rate of deflection, has chosen to compute the fraction between the deviation and the mean of the series. In the middle of the series, through the means of the data recorded. To make the prediction, has been used trend line of each series being predictive formula "y = a.x + b" and applied to predict the years. They have operated two indices of aridity and rainfall, to meet the climate of the city of Palma. The Cia index, annual rainfall irregularity is obtained with fraction between more and less precipitation series of 30 years. (Cia = Month Pmax / Pmin Month). Moreover Martonne index (Im = Pmedia / TM + 10) fraction is obtained between the rainfall and mean temperature plus 10, in the case of formula extrapolated months.

4. Results

The section includes the objective results of the statistical analysis of climatic series in relation to climatic questions to learn the subjective perception of climate. Previously, some climatic indices of climate at Palma exposed. The following table shows the rate of annual rainfall irregularity.

Table 1: Index Interannual Rainfall Irregularity of Porto Pi

Porto Pi	Maxim	Minimun	Cia
1984/2013	702,2	225,7	3,11

The index score of 3.11, is a high value, so it is determined that the interannual irregularity is high. Between series exist maximum and minimum to arid and moist areas of the island places.

Table 2: Martonne Index and Classification Series Porto Pi

PortoPi 1984/2013	J	F	M	A	M	J	J	A	S	O	N	D	ANUAL
I Martonne	24,6	20,3	14,0	18,0	15,7	4,6	2,2	7,7	18,9	28,7	33,7	24,7	16,8
Classification	4	4	3	3	3	1	1	2	3	4	5	4	3

Desert (1) - Semidesert (2) - Semiárid (3) - Subwet (4) - Wet (5) Martonne rate applied in the average of the month and the annual rainfall. The diversity to rainfall months of the Mediterranean climate is wide. There are two months classified desert in summer, but with a high contribution of maritime moisture. As an semidesert month, four semiarid months, what this month are transition between summer and winter, four sub-humid months, all in autumn and winter and november is classified wet. Therefore we can consider the island as a territory of rainfall variability, depending on the seasons, in addition to the relief and the winds

4.1. Where it Rains More in the Countryside or the City?

The matrix with the dichotomy between precipitation of town and country, confirms that in the urban setting annual rainfall is higher, exactly 11%.

The months that situation is reaffirmed, except for July, which is more rain in the countryside, although the percentage of -0.1 less rainfall, not unlike any difference to consider. In December rain between town and country is similar. Virtually all months of the year, more rains in the city, 52% in August, 19% in July, 18% in May, 16% in January and April, 12% in February, March and October, 0.6 % in November and 0.35% in September. In the city in August rain 52%, is due to the heat island town with turbulence and convection air, facilitating the formation of more active cumulonimbus. According to the results of the series, the table shows the average of 30 years of the two seasons.

Table 3: Mean Precipitation Series 30 years of Porto Pi and Airport

Location	J	F	M	A	M	J	J	A	S	O	N	D	TOTAL
Airport	38,4	33,4	24,4	32,3	31,3	13,3	5,4	15,2	51,1	63,4	67,8	47,2	423,2
Porto Pi	44,5	37,4	27,2	37,6	37,0	12,2	6,4	23,1	52,7	71,0	72,2	47,3	468,6
Difference %	16	12	12	16	18	-0,1	19	52	0,3	12	0,6	0	11

Between town and country differences in climate phenomena, the study in the city of St. Louis (USA). Urban conditions produce increases in climatic agents rain, clouds, snow, fog, temperature, cores particles in the air and extreme storm events. Instead, agents reduce moisture, solar radiation, visibility and wind speed. As an example, in cities snow is most likely formed in rain than in the countryside. As the fog increases in cities. In the own case, between the two stations of the study no event occurs, since in the airport area mists are more casual, by the provision of land, plain and low altitude. Some studies claim that urbanization alters precipitation in the cities of Chicago, St. Louis, Cleveland and Washington (Huff and Changnon, 1970, Huff et al, 1971). In St. Louis, in the summer of 1971, in the area of the city with more industrial activity, precipitation increased between 10-17%, days with moderate rainfall between 11-23%, and storms between 20 -80% (Huff et al, 1971). As between 1950-1958, urban effects have substantially increased storms comparatively rural environment (Changnon and Huff, 1971). Assessing the perception of respondents on the island, 55% believe that it rains more in the field, 38% alike and 7% in the city. For example, in the city of Zaragoza, 53% answered as rainest the field and 36.5% the city, the study contrasts in town rains between 10-15% more than in the countryside, in that if the previous perception is wrong, the causes are due to perceive the field as the natural source of water, rivers, reservoirs and lakes, (Lopez, 1995). Another effect of urbanization is the difference between the amount precipitated town and country in St. Louis, affecting urban activity a week, without influences by local orography.

The urban topography causes decreased sky view factor SFV (vide, 1990). Thus the urbanite has a distorted perception versus rural inhabitant, with open skies.

4.2. How Many Months has been without Rain?

Before analyzing the series, is solved many months has been no rain in the two meteorological stations Palma. At the airport, as long rainless period, there have been two consecutive months without precipitating, both June and July in 1984 and 2007. Similarly, the registration of a month without rain were as follows: 3 months of June (2001, 2005, 2007), 6 of July, (1991, 1998, 2003, 2007, 2009, 2010) and 4 of August, (1985, 1986, 1999, 2012). Similarly, in Porto Pi, have not been two consecutive months with no rain and no rain occurred months were as follows: 3 months in June (2001, 2005, 2007), 7 months of July (1984, 1988, 1994, 1996, 1998, 2003, 2009) and 5 months of August (1985, 1986, 1999, 2001, 2011). The respondents perception of the study is successful in 17% in the series from the airport and 12.5% in the series of Porto Pi,. In the total series, the airport has been 17 months without rain and Porto Pi have been 15 months.

4.3. What Day of the Week it Rains More?

As to the question of what day it rains more, we have chosen to compute every day of the year 2013. The table shows that the rain is random, without justification, or a regular pattern of behavior depending on rainfall week. The most rainy days of the week were on Sunday (22%), on Monday (21%) and Tuesday (20%). These three days encompass 63% of the precipitation throughout the year. On Friday, Saturday, Thursday and Wednesday are the days with lower rainfall respectively, representing 37% of the year. In terms of perception, Tuesday and Friday are the days weighted respondents precisely on Tuesday with high values of rain and Friday with minimum values recorded, reflecting the disparity of perception. Moreover in the perception of respondents, 63%, think alike in Palma rains every day. The distribution of rainfall is not homogeneous throughout the week, which despite being the random rainfall, there are days of the week with records of different precipitation, with values highs and lows. There are theories in the US, (Changnon et al, 1971), which state that in big cities, urban activity in the working days, rainfall increases. The causes are increasing temperature and atmospheric aerosols. In the case of small towns and in this case Palma, exposed theory is inappropriate to consider.

Table 4: Precipitation and Perception of the Days of the Week

Porto Pi 2013	l/m2	% year	Perception n=93
Su	109,9	0,22	4
Mo	104,7	0,21	1
Tu	97,6	0,20	10
We	55,2	0,11	4
Th	51,2	0,10	4
Sa	46,5	0,09	2
Fr	33,6	0,07	9
Week	342,3	0,69	15
Weekend	156,4	0,31	19
Equally			59

Due to precipitation weekday and weekend is the annual distribution is balanced, since 69% of the year it rains on weekdays and 31% on weekend rains. This situation is parallel to the ratio of the number of days per year being 70% of the week and 30% weekend. In the city of Zaragoza, López, 1995, respondents perceive the Friday, Saturday and Sunday as the rainiest week. In 1993, in the city of Avila, respondents perceived that on Friday, Saturday and Sunday were the wettest, a perception not adequate to reality, in which there is no scientific verification of regular rainfall between days of the week, (Lanchas, 1995). According to other authors, (Cehak, 1982 vide, 1990), the majority of respondents value the Saturday and Sunday the rainiest. These decisions are well perceived for leisure time outdoors we do on weekends. Moreno (1988) states that in the city of Barcelona is not equiprobable precipitation between days of the week, rejecting the hypothesis of subjective wettest weekends the rest of the week. On the count of days of rain in Porto Pi Station (2013), these have been 95 days. In November, January and February half days have been rainy month. In December the number of days have been 5, a few days due to the calm of January the island, due to the influence of the Azores anticyclone, which affects the Balearic Islands in this time of the year, leaving prolonged days with clear skies. In the summer rains are on time and on many occasions in small quantity. In April and September third month there are rainfall, they are transitional months between summer and winter and vice versa.

Table 5: Rainy Days per Month of the Year

PORTO PI 2013	J	F	M	A	M	J	J	A	S	O	N	D	T
Rain days	15	14	11	9	4	2	2	4	8	5	16	5	95

4.4. What is More Rainy Season?

The following table shows the rainfall of the seasons, the two weather stations, the percentage between Porto Pi and the Airport are similar. Autumn as rainiest normal pattern of Mediterranean climate, observed the other stations have a set percentage including a range in descending order, winter, spring and summer. The autumn rains are associated to Danas, "Highs Atmospherics Depressions" with a warm sea and the arrival of cold fronts from the north, causing atmospheric instability and torrential rainfall. Winter cold fronts from the west and northeast persist. In spring breezes atmospheric circulation begins in the island, with convective clouds and winds up with high humidity contributions. In summer the phenomenon of convective precipitation is in the center of the island, high rainfall intensities. Regarding the perception, 54% think that autumn is rainiest. Among winter (25%) and spring (21%) perception seems to be similar, registering the two stations 41% of the annual rainfall, while summer no one respondent perceives as the wettest, although accounting for 18% of the rain of the year. Therefore, the perception of respondents as rainy seasons is correct, adapting to autumn, winter, spring and summer respectively.

Table 6: Precipitation and Perception Seasons (1984/2013)

Location	Autumn	Winter	Spring	Summer
Porto Pi	190,4	109,2	86,8	82,2
Percentage	41	23	19	18
Aeropuerto	178,4	96,2	76,9	71,6
Percentage	42	23	18	17
Perception n=96	52	24	20	0

4.5. What are the Wettest Months and with Less Rain?

Monthly rainfall respect, referring to the series in the amount of rainfall, the results are shown below. The months of October and November with similar values are the wettest, both accounting for 30.6% of the year. Accounting for 11.2% in September and December by 10.1%. These four months account for 51.9% of rainfall throughout the year. These four months include whole autumn season. The months of January, February, April and May cover 33%, and among them the regular rate. Among the driest months, June, July and August, rainfall is 8.9%, with a summer water deficit, these wettest month is August, a 4.9% annual. On the regularity of the series by month, it turns out that the irregular month with a larger deviation is October, precisely the second wettest month, however in November the wettest month its deviation is reduced, so November is the month with more reliable rainfall. The months of January, February and March the deviation between them is similar to a low index shows that the winter months are regular to interannual scale. December and May has a high deviation, so the irregular rainfall is high. The summer months, with high temperatures the deviation is around 1.3, with most of the days without rainfall and rainy days with little amount of fallen liters, July is a month with low rate because the month with and fewer days of rain a year. When considering the maximum monthly rainfall series 30 years, October and November exceeded 200 l / m2, May and November 190 l / m2, January, February, April, August and December 100 l / m2 and March, June and July the 50 l / m2. The months with the highest percentage to rain respect the average of the series have been from highest to lowest, March, December, November, April, January, October, February, September, August, May, June and July. In the months of February, March, April, May, September, October, November and December for 30 years has always rained, with minimal compared to the average between 2.5 and 11.6%, respectively. But in the months of January, June, July and August there have been months without rainfall.

Table 7: Precipitation and Perception of the Months of the Year (1984/2013)

PORTO PI	J	F	M	A	M	J	J	A	S	O	N	D	T
Average l/m2	44,5	37,4	27,2	37,6	37,0	12,2	6,4	23,1	52,7	71,0	72,2	47,3	468,6
% annual	9,5	8	5,8	8	7,9	2,6	1,4	4,9	11,2	15,2	15,4	10,1	100
Index deviation	0,6	0,6	0,5	0,9	2,0	1,3	0,7	1,2	1,4	3,0	1,0	2,0	1,1
Maxim month	137,4	112,8	68,9	111,7	196,9	65,5	58	119	207,3	219	190,8	121,7	702
% average	32,4	33,2	39,5	33,6	18,8	18,6	11,2	19,3	25,4	32,4	37,8	38,8	66,7
Minimun month	0	2,7	3	1,3	1,6	0	0	0	1,3	3,4	0,6	5,5	226
% average	0,0	7,2	11,0	3,5	4,3	0,0	0,0	0,0	2,5	4,8	0,8	11,6	48,2
perc n=96 -	1	0	0	0	2	4	68	19	1	0	0	1	
perc n=96 +	2	10	10	24	0	0	0	0	4	17	27	1	

In the perception of the months, during wet months the answers are more distributed, while in the least rain are more centralized. 28% correct in November, a 50% correct in the months of September, October and November and 25% perceived April as wrong, without being the wettest. As at least rainy month, 70% correct in July and 95% in the summer months. In 1993 in Avila 37.8% answered that the rainiest month is April, being in April statistics as dry month and recording half the annual rainfall between June and October. The paradox is that nobody answered the month of June as rainiest, (Lanchas, 1995). Thus the distortion of perception is denoted with no sound beliefs.

4.6. How has Rained for Climate Change?

The annual precipitation average is 458.8 mm that serie 1984/1994, the 1984/2013 series is 468.6 mm and the last four years 2000/2013 is 515.7 mm,. The tendency of these 30 years is that today it rains more than in the past thirty years. As for the prediction of 2020 and 2030 will be lower rainfall and increase in 2040. Referring to the months of January, February, March, April, May and June, today it rain less, while in July, August, September, October, November and December rains today more than thirty ago years. According to the prediction of 2040, in February and June will rain less. In January, June and December will rain are similar, while March, April, May, August, September, October, and November will be more rainiest. The data show that precipitation increases in the months that phenomena are more intense rainfall, predicting increase in future episodes of heavy rains, especially in the autumn months, and decrease rainfall in the summer months.

The results show that the climate is cyclical in Palma, long-term it rain more, going for years with less precipitation than average, although these years low rainfall records, over the years, to increase the rain.

Table 8: Means and Predictions Series (1984/2040)

Periods	J	F	M	A	M	J	J	A	S	O	N	D	T
Average 1984/1994	46,6	41,1	29,2	43,1	42,1	13,6	5,7	19,8	45,0	69,7	64,2	38,7	458,8
Average 1994/2004	41,9	29,7	16,9	30,7	23,7	13,1	9,1	24,1	52,1	70,3	72,8	58,7	443,0
Average 2004/2013	45,0	41,5	35,7	39,0	45,4	9,9	4,5	25,3	61,0	73,0	79,6	44,4	504,1
Average 1984/2013	44,5	37,4	27,2	37,6	37,0	12,2	6,4	23,1	52,7	71,0	72,2	47,3	468,6
Average 2010/2013	61,7	41,3	37,0	37,8	43,8	8,8	6,0	26,9	32,5	80,5	112,8	26,7	515,7
Prediction 2020	50,3	46,8	30,8	42,7	41,3	21,8	13,2	23,9	52,8	75,0	66,0	53,7	441,1
Prediction 2030	60,3	56,8	40,8	52,7	51,3	31,8	23,2	33,9	62,8	85,0	76,0	63,7	451,0
Prediction 2040	45,5	35,6	30,0	39,1	39,3	10,1	6,6	27,9	58,2	73,4	82,6	47,7	496,0

Table 9: Perception the Rain in the Climate Change

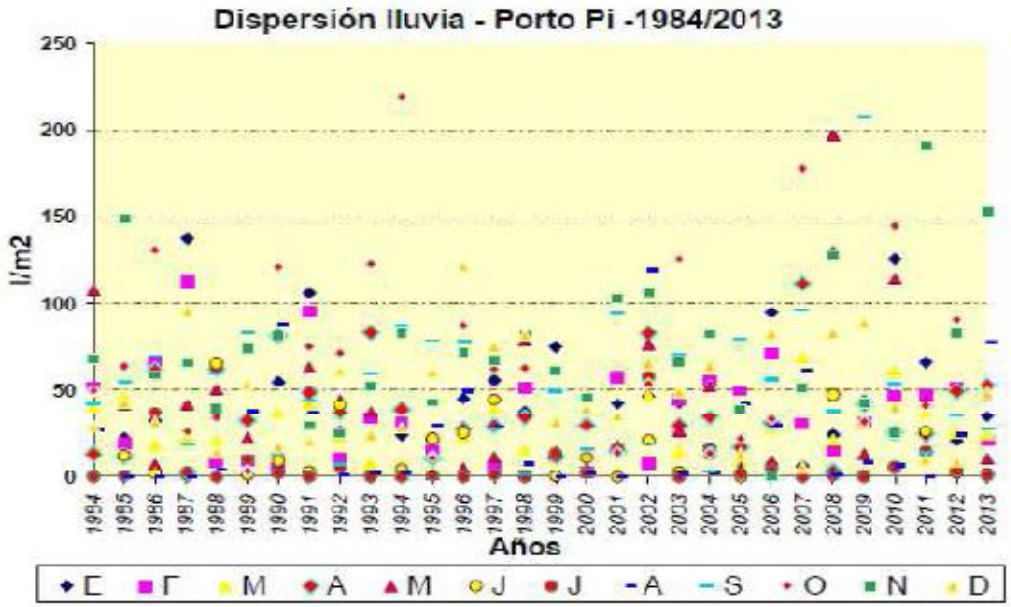
PERCEPTION n=80	More rain	Less rain	Same rain
Past	12	44	24
Future	13	45	22

Perceptual interpretation is that it rained most less and will rain less, valuations of more rain in the two periods is low and a quarter of respondents believe that rainfall are equal. The perception of past and future is the same, ie the experience of the past and the future events are interpreted the same way, one conclusion is that the view that climate change is a difficult heritage to reverse. In 1993, 91.88% respondents in Avila, believe that now it rains less than before, however erratic weather can not determine the hypothesis. (Launches, 1995)

4.7. How Much Rain there a Year?

In the city of Palma, the average annual rainfall recorded in the series 30 years of 1984/2013, is 468.64 l / m2.

Figure 2: Graph of Precipitation by Dispresión Series Months



The graph shown the rainfall for the months of every year in the series. Majority of rain per month is between 0-100 l / m2, being more concentrated between 0-50 l / m2. There are 18 months in which records have ranged from 100-150 l / m2, four months between 150-200 l / m2, (12/2007 to 177.9 l / m2), (5/2008 to 196.9 l / m2) (11/2011 to 190.8 l / m2) and (11/2013 to 152.1 l / m2)), and two months 200-250 l / m2 (10 /1994 to 219 l / m2) and (9/2009 to 207.3 l / m2). The graph shows that between 2007 and 2013, records are higher and ends above the mean, precisely in the autumn months. The years with lower rainfall records are from 1997 to 2000, precisely at the center of the series. Noting the trend are given two points of rains at the beginning and end of the series and a minimum in the central part, which is checked at intervals, oscillating, approximate to 11 years, coinciding with solar cycles Milankovic.

Table 10: Total Annual Precipitation and Perception

Annual rain Palma 2013	
l/m^2	perception n=89
0/250	22
250/500	24
500/750	29
750/1000	11
1000/1250	3
468	**Average 30 years**

On the question of the amount of annual rainfall in Palma, perception is correct by 27% and 73% perception is wrong. These rainfall thresholds have been established for the most common isolines in Majorca. Palma, bordered to the east by a threshold below (Llucmajor), north to a threshold above (Esporles) and west retains the same threshold (Calvia).

4.8. Gender Perception

Interestingly, now do mention the perception by gender of respondents. Were obtained gender identity of 95 people. 56% male and 44% female. Here are the results of perceptual responses are shown. The man considered the rainiest days on Friday and Saturday, while the woman on Sunday. In the month with most rain man perceived November and October, with greater success than women highlighting April and February. In the place where it rains more, the woman has a higher percentage of responses in the city, being more successful. In the less rainy month, the responses of both are the majority in July, in line with reality. In the annual seasons, respondents agreed, in autumn, adapting to the real situation. In the months without rain, man perceives longer periods without rain, symbolizing a major misperception. The amount of rain, rain overestimates man than woman. And in the perception of climate change on rainfall, man is more likely to say that it rained and rain like today, while the woman ponders over climate change.

5. Discussion

The perceptions of situations rainfall in Palma, are not all successful after performing statistical climatic series. According to the questions, there are different degrees of perception. Among the dichotomy of precipitation in urban and rural areas, the perception of increased rainfall in the area is not correct, and that the records are higher in the city. On the question of how many months has been no rain, perception is approximate adequate to reality, without being exact. As the day of the wettest week, perception is not accurate, since rain is random, although the distribution of annual rainfall, is partner to the distribution of the annual calendar days of the week and weekend. The perception in the rainiest season is right, in a logical order between the perception and the annual rainfall. When considering the month rainiest of the year, the perception is correct in one gruop of the respondents, but not majority, having a general answers conditioned by sayings and myths settled in society. In the perception of the month less rainiest, the answers are more unanimous and correct. To set the rain occurred in the past and the future, the overall perception of whether it rained more in the past is incorrect, as is the perception that in the future it will rain less too. Statistical says, the trend since 1984/2040 is highest annual rainfall, although a small percentage, year-including fluctuations with low and high precipitated amounts. For the amount of annual rainfall, perception is not correct, with a low degree of valid opinions, possibly because the different rainfall distribution on the island.

6. Conclusion

Before the study, there are several reasons why the perception of reality is distorted. Despite believing know the behavior of rainfall in Mallorca, the reality is different perception. In total responses, the most successful were the responses related to the months and seasons, very present in the annual calendar of the people, because we are adapted to seasonal changes and our reality progresses in parallel with the natural environment. Other responses, more spatial character, as the days of the week, the amount of rain, or rain predictions in the territory, are more difficult to perceive, reason are not usual topics of conversation or are present in the typical patterns meteorological information. Keep in mind that the population of Palma is urban, but there is a general relationship with the natural environment, marine, agricultural, sports and mountain areas.

This reason does that perception, you get to set the actually better than other locations of cities with less attachment to the environment. The study represents from the city of Palma, the distribution of rainfall over the last thirty years, considering innovative aspects of perception. Today the weather gets closer to the people, being of general interest. It is important to know the perception. All daily activity is related to the weather. Climate change, linking the new politics of global change and people as involved players. I believe that prevention actions, perception is valid, to learn to communicate the true climate change, without falling into false expectations related myths, misunderstandings and distortions of reality of the physical environment.

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