

**THE RELATIONS BETWEEN POPULATION AND
TERRITORY THROUGH DAILY POPULATION
MOBILITY**

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ABSTRACT

If everyday life of European population has one specific characteristic, this is the spatial mobility linked with the use of space. Spatial mobility implies that the distribution of population will be different depending on the hours of day (working hours, leisure hours...), the days of the week (weekends and labour days), the month of the year (vacation or work month).

In this paper, there is an analysis about how the spatial mobility of population implies a different distribution of population. The case study is Catalonia, an industrial region of Spain with 6 millions of inhabitants, with 30.000 km² and 943 municipalities, and with a strong urban development: Barcelona, the place of 1992 Olympic Games is the capital of Catalonia. The analysis of the distribution of population is made for all the municipalities of Catalonia, and for the work days and weekends of the twelve months of the year 1991.

Why is important analyse the seasonal population of Catalonia? Some figures explain the reasons: in 1992, Catalonia has near 15 millions of holiday makers and there is a capacity for most than 9,8 millions of inhabitants to sleep in some kind of dwellings. There are some places than the census population is multiplied by more than ten, like sea shore areas: one example could be the municipality of Salou, with 7.264 census inhabitants but 80.720 in July. And there are many cases of that different population between census data and our estimation.

To sum up, in this paper we will explain the source data, the mathematical operations and the main conclusions.

RÉSUMÉ

Si la vie quotidienne de la population européenne a une caractéristique, celle-ci est la mobilité spatiale se rattachant à l'usage du temps. La mobilité spatiale implique que la distribution de la population sera différente en fonction des heures du jour (heures de travail, heures de loisir...) les jours de la semaine (week-ends et journées de travail), les mois de l'année (vacances ou mois de travail).

En cette communication on analyse comment la mobilité spatiale de la population implique une différente distribution de la population. Le cas étudié est la Catalogne, une région industrielle espagnole avec 6 million d'habitants, 30.000 km², 943 municipalités et un développement urbain très fort, Barcelone, la siège des Jeux Olympiques de 1992. L'analyse de la distribution de la population a été faite pour toutes les municipalités de la Catalogne, pour les jours de travail et les fins de semaine et pour tous les mois de l'année 1991.

Pourquoi est-elle important d'analyser, la population saisonnière? Quelques chiffres expriment les raisons les plus importantes. En 1992 la Catalogne avait 15 millions de touristes, il y a la capacité d'auberge plus de 9,8 millions d'habitants dans une sorte forme d'habitation. Il y a aussi certes lieux où la population recensée se multiplie pour dix, comme en certes aires touristiques littorales: un exemple pourrait être la municipalité de Salou, avec 7.264 habitants recensés mais 80.720 au mois de juillet. Et il y a encore beaucoup de lieux avec cette différence entre population recensée et notre estimation.

En bref, en cette communication on racontera les sources, les opérations mathématiques et les principaux conclusions.

RESUM

Si la vida quotidiana de la població europea té una característica, aquesta és la mobilitat espacial en relació amb l'ús de l'espai. La mobilitat espacial implica que la distribució de la població pot ser diferent segons les hores del dia (temps de treball, temps de lleure...), els dies de la setmana (caps de setmana i dies laborables), el mes de l'any (mes de vacances o de treball).

En aquest paper es fa una anàlisi de com la mobilitat espacial de la població implica una diferent distribució de la població segons el període de l'any. El cas estudiat és Catalunya, una regió de 30.000 km² amb 6 milions d'habitants, amb un fort desenvolupament industrial i urbà. L'anàlisi de la distribució de la població s'ha fet pels 943 municipis de Catalunya, i pels dies laborables i caps de setmana dels dotze mesos de l'any 1991.

Per què és important analitzar l'estacionalitat de la població a Catalunya?. Alguns exemples poden explicar les raons: l'any 1992, Catalunya va rebre aproximadament 15 milions de turistes, i hi ha una capacitat que supera els 9,8 milions de persones que poden dormir en alguna mena d'habitatges. Hi ha

alguns llocs on la població censada es multiplica per deu, com les zones costaneres: un exemple pot ser el municipi de Salou, amb 7.264 persones censades però amb 80.720 persones el mes de juliol. Com és obvi, hi ha molts més casos en que la població censada és molt diferent de les nostres estimacions estacionals.

Per acabar, en aquest paper s'explicaran les fonts utilitzades, les operacions matemàtiques i les principals conclusions.

RESUMEN

Si la vida cotidiana de la población europea tiene una característica esta es la movilidad espacial en relación al uso del espacio. La movilidad espacial implica que la distribución de la población puede ser diferente según las horas del día (tiempo de trabajo, tiempo libre...), los días de la semana (fines de semana y días laborables), el mes del año (mes de vacaciones o de trabajo).

En este documento se analiza el hecho de cómo la movilidad espacial de la población conlleva una distribución diferente de la misma según el período del año. El caso estudiado es Cataluña, una región de 30.000 Km², con 6 millones de habitantes y con un gran desarrollo industrial y urbano. El análisis de la distribución de la población se ha hecho en los 943 municipios de Cataluña, durante los días laborables y fines de semana de los doce meses del año 1991.

¿Por qué es importante analizar la estacionalidad de la población en Cataluña?. Algunos ejemplos pueden explicar las razones: durante el año 1992, Cataluña recibió aproximadamente unos 15 millones de turistas, teniendo en cuenta que la capacidad de personas que pueden dormir en cualquier tipo de alojamiento supera los 9,8 millones. En algunos lugares la población censada se multiplica por diez, como son las zonas costeras: un ejemplo puede ser el municipio de Salou, con 7.264 personas censadas pero con 80.720 personas durante el mes julio. Obviamente hay muchos más casos en que la población censada es muy diferente de nuestras estimaciones estacionales.

Para finalizar, en este documento se explicarán las fuentes utilizadas, las operaciones matemáticas y las principales conclusiones.

THE RELATIONS BETWEEN POPULATION AND TERRITORY THROUGH DAILY POPULATION MOBILITY.

Why is the daily mobility of the population important?

The normal way of analysing the multiple relations between population and territory is based on the following idea: the population analysed is the one which lives in a particular territory. But this idea has to be clarified as regards what "living" in a particular territory means. If by "living in a territory" we mean performing our daily activities (including those of residing in a home, working, shopping, carrying out leisure activities, seeing friends, neighbours and relatives, etc.), the territory in which we perform all these activities generally extends over a much larger area than our town or city.

Studies of the relations between population and territory have to bear in mind that individuals do not perform all their activities at one single point in the territory, and that analysis of mobility in carrying out our daily activities is, therefore, more and more crucial for understanding the relations between population and territory.

The present article analyses some examples of daily population mobility in Catalonia, allowing us to see the different uses to which the territory is put by the population.

What do we mean by "population"?

The population is generally defined as a group of individuals who co-exist at a given moment, delimited according to different criteria. A population is, in most cases, the population of a certain territory. In the case which concerns us here, the population is a group of human

beings with certain characteristics (demographic, historic, social, economic, etc.) occupying a referred space and moment in time.

The population of Catalonia which we will analyse in this article will be all those who are present, at one moment or another, in any place within the administrative boundaries of present-day Catalonia.

Some reflections on population mobility.

One of the fundamental characteristics of a population, whether the Catalan population or that of any other part of the world, is its mobility. We mentioned above that individuals perform various activities, and it would appear obvious that in order to do so, it will often be necessary to move from one place to another. And to go to the different places where individuals carry out their activities it is necessary to move.

The mobility of individuals, therefore, causes their situation in a territory to alter over time. We can take three different examples of this, according to the temporal rhythms of a day, a week and a year. The rhythm of a working for a working adult is governed, principally, by mobility from place of residence to place of work, as well as the mobility involved in going to other places on a more or less daily basis: household shopping, leisure activities such as going to the cinema or for a walk, etc., or those which entail a certain social relationship (for instance, taking part in the activities of groups and associations). If we refer, rather than to a working adult, to an individual who studies, mobility will be more or less the same, with the exception that the crucial journey of the day would be the one from place of residence to place of study.

The weekly rhythm is given by the territorial difference between the place where the activities of working days are performed and that where weekend activities take place. The latter tend to involve more leisure-type activities than the former, and often entail travelling to second residences, eating out and going on excursions or outings. The annual rhythm also separates working or study time from the holiday period. Holidays often involve travelling away from the town or city of normal residence to go on a journey or spend a long period of time (summer, Christmas, Easter) at a second residence.

The population data usually employed to study the relationship between population and territory are those taken from censuses and rolls of residents. These documents reveal the number of people registered in a particular district, as well as certain of their characteristics (sex, age, marital status, activity, year of arrival in the district, etc.). Obviously, all this information is useful: where the population is young, schools will be built, where it is old, homes for the elderly.

But if we bear in mind that mobility is one of the principals characteristics of the populations of Western societies, of which the population of Catalonia is a clear example, then we see that the census or registered population is not sufficient data to ell us the population is not sufficient data tot tell us the population of particular place at a particular time. The mobility we discussed above, according to daily , weekly or annual rhythms shows that the town (or

district) is not the only venue of action, but forms part of a network of places, the complementary relationship between which is becoming ever more intense, and that any individual person, depending on activity he/she is performing at a given moment, may be found in any of a number of different places. We will now look at the results of two studies which deal with this subject, and which show how the relations between population and territory vary with the mobility of the population.

The Barcelona Metropolitan Survey.

The information required for studying the territorial location of individuals according to the activity they are performing does not appear in censuses. For this reason, surveys need to be carried out in order to obtain reliable enough data for such studies. In the case we are concerned with, the *Enquesta Metropolitana de Barcelona 1990* (Barcelona Metropolitan Survey 1990, EMB), is indispensable. The EMB is a periodically-employed instrument (the first was carried out in 1985) of gathering data on the different venues of social life, living conditions and habits of the population of Barcelona Metropolitan Region, defined as the area formed by the 127 municipalities of the Baix Llobregat, Barcelonès, Maresme, Vallès Occidental and Vallès Oriental districts.

The information from the EMB used for the purposes of this study refers to the territorial location of 23 activities divided into four broad areas: work, supply, leisure and social relations. The territorial location of activities has been crossed with a series of social, economic and demographic variables of the individuals surveyed: sex, age, relation with activity, level of studies completed, socio-economic class and type of municipality of residence (classified according to number of inhabitants). Crossing these variables with the territorial locations of the activities allows us to demonstrate how territorial use is different according to the characteristics of the individual.

A basic concept: living space

The key concept used in this study based on the EMB is that of "living space". Living space is understood to be the portion of territory in which the individual performs his/her activities. The notion embraces the main places occupied - such as place of residence or work -places passed through -the space travelled through from one place to the other - and all those other places with which the individual is related -habitual and non-habitual venues for shopping, places where he/she goes for walks, where he/she relates with other individuals, etc.

Table I. The typical living space of the inhabitants of Barcelona Metropolitan Region in 1990

| | |
|------------------------------------|------|
| Adress | 1.2 |
| Neighbour hood | 31.6 |
| City center | 9.1 |
| Other districts | 18.5 |
| Barcelona | 6.8 |
| Medium-sized cities | 1.3 |
| Rest 1st Metropolitan Ring | 2.2 |
| Rest 2nd Metropolitan Ring | 2.8 |
| Other locations outside BMR | 10.0 |
| Indistinctly | 16.4 |
| Not stated | 0.10 |

Table I shows the typical living space of the inhabitants of Barcelona Metropolitan Region in 1990. The results of this table reveal the percentage of activities performed in each location compared to total possible activities. To summarise Table I, one-third of activities are performed in each location compared to total possible activities.. To summarise Table I, one-third of activities are performed in the district of residence. These tend to be the more daily activities, such as shopping, going for walks, etc. Another one-third of activities are performed in the rest of the town or city: more leisure-based activities (free-time activities involving cinemas, bars, discotheques, etc.)and those involving participation in bodies and associations of all types in the centre, whilst work activities tend to be performed in the outskirts, as this is

where industrial estates are generally situated. The remaining one third of activities either do not have a fixed location (individuals opting for the answer "indifferent") or take place in central zones of Barcelona Metropolitan Region: Barcelona, which attracts a large proportion of the population for activities of all types, and the medium-sized cities of Granollers, Mataró, Sabadell and Terrassa) which offer the same activities as Barcelona but on a much smaller territorial scale. Finally, an important place is also occupied by leisure activities related to the holidays, which usually take place outside Barcelona Metropolitan Region.

Living space according to individual characteristics.

It is impossible to summarise all the differences in living space according to the categories of each variable. Briefly, however, we can make the following observations:

a) There are two variables which reveal a direct relationship between disposal of a more extensive living space (that is to say, that a larger number of activities are performed outside the district of residence) and being in a "better" situation within the category: the activities of those who have completed university studies or who belong to the upper socio-economic classes have a much wider and more disperse territorial location both inside and outside Barcelona Metropolitan Region than those who have only completed primary studies, or who have none or belong to the lower socio-economic classes.

b) The age of individuals evolves sequentially in reference to the territorial range and dispersion, of activities: those beginning their life cycle, that is, young people still living in their parents' home, are those who perform the most activities outside the district of residence, whilst those approaching the end of their life cycle (elderly people, normally widowed, living alone) are those who perform most activities inside the residential area. Thus we see that, as the family circle is formed (spouse, offspring), which occurs as the age of the individual advances, instances of the individual leaving the district of residence to perform different activities decrease.

c) The remaining variables show that women perform many more activities in the district of residence than do men, as women continue to carry out the greater part of the work of reproduction, a devotion which entails greater proximity to the home to avoid spending time travelling around. Differences in living space according to relation with activities mix questions of age and life cycle (pensioners are elderly and students young), sex (women tend to housework), health (the disabled). Students (young people at the beginning of their life cycle) have the most extensive living space, whilst housewives, pensioners and disabled persons have the most limited living space. Working people and unemployed people occupy the middle space in this category. There is an interesting difference in size of living space according to the category of district of residence: the more inhabitants the district has, the more activities are performed there; whilst residents in Barcelona perform 69% of their activities there, those living in municipalities of less than 2,000 inhabitants only carry out 41% of their total activities

in the district of residence. Without a doubt, the explanation for this lies in the fact that fewer activities can be performed in smaller municipalities, and inhabitants are therefore forced to go elsewhere in order to carry them out.

Seasonal population in Catalonia

The Catalan Department of the Environment commissioned the Centre of Demographic Studies to carry out a study to establish the seasonal population of all the municipal districts of Catalonia on 30 April 1993, in order to size environmental management infrastructure. The object of the study, then, was to ascertain how population size in all the municipal districts of Catalonia varies over the course of the year. This article will use some of the results obtained by the study in order to reflect on the importance of population mobility on the relations between population and territory.

The particular interest of the above-mentioned study lies in the fact that the well known local slogan *som sis milions* ("**there are six million of us**") needs to be qualified: in Catalonia, at any given moment in the year, there are more than six million of us. Figure I shows the evolution of the population of Catalonia over the year 1993, which can be compared with three population figures which are constant for the entire year: the population census, average population and maximum capacity.

The "population census" is that obtained from censuses and rolls of residents and which, in our case, responds to all those individuals who were present (or who were not present for exceptional reasons but who are habitually present) at 24.00 on 1 March 1991. The "seasonal population" is those persons who are in each municipal district on working days and non-working days in each month of the year. The seasonal population of each municipality was calculated according to the obligatory mobility due to work or study, level of occupation of hotels beds, camp-sites, holiday homes and second residences and the population of the municipal district which goes away for holidays and festive periods. The "average population" is the seasonal population at each moment in time considered evenly distributed over the year. "Maximum capacity" was calculated by adding to the census population the entire population which could be accommodated in the second residences and empty dwellings (four persons per dwelling), in the hotels (two persons per room) and in the holiday homes.

In order to answer the question «what do we mean by "the population of Catalonia"», there are a number of fact in Figure I which need to be pointed out:

a) Whilst the registered population of Catalonia in 1991 was 6,059,494 inhabitants, maximum capacity was just over 9,800,000. We need to take into account that this is an under-estimate, as the calculations assumed that dwellings occupied by the census population could not accommodate anyone else. However, it must also be remembered that camp-site

spaces (using tents) are not normally occupied in winter. If we subtract the nearly 250,000 persons who can be accommodated at camp-sites, the population which could at present sleep with a roof over their head in Catalonia is over 9.5 million.

b) Comparing census population with average annual population, we see that the latter is higher by over 675,000 persons. With the exception of the Barcelonès, none of the population of any of the districts of Catalonia, or of the provinces of Girona, LLeida and Tarragona, exceeds this figure.

c) If we observe the population on working and non-working days for each month, we see that the population is always higher than the census population, although at certain times this difference is minimal (for example, on working days in the months of February, October and November). There are also more inhabitants on non-working days in each month than on working days. This can be readily explained in one word: tourism. During the 1993 tourist season, over 13 million people from outside Catalonia entered the region, Catalonia has over

SEASONAL POPULATION OF CATALONIA

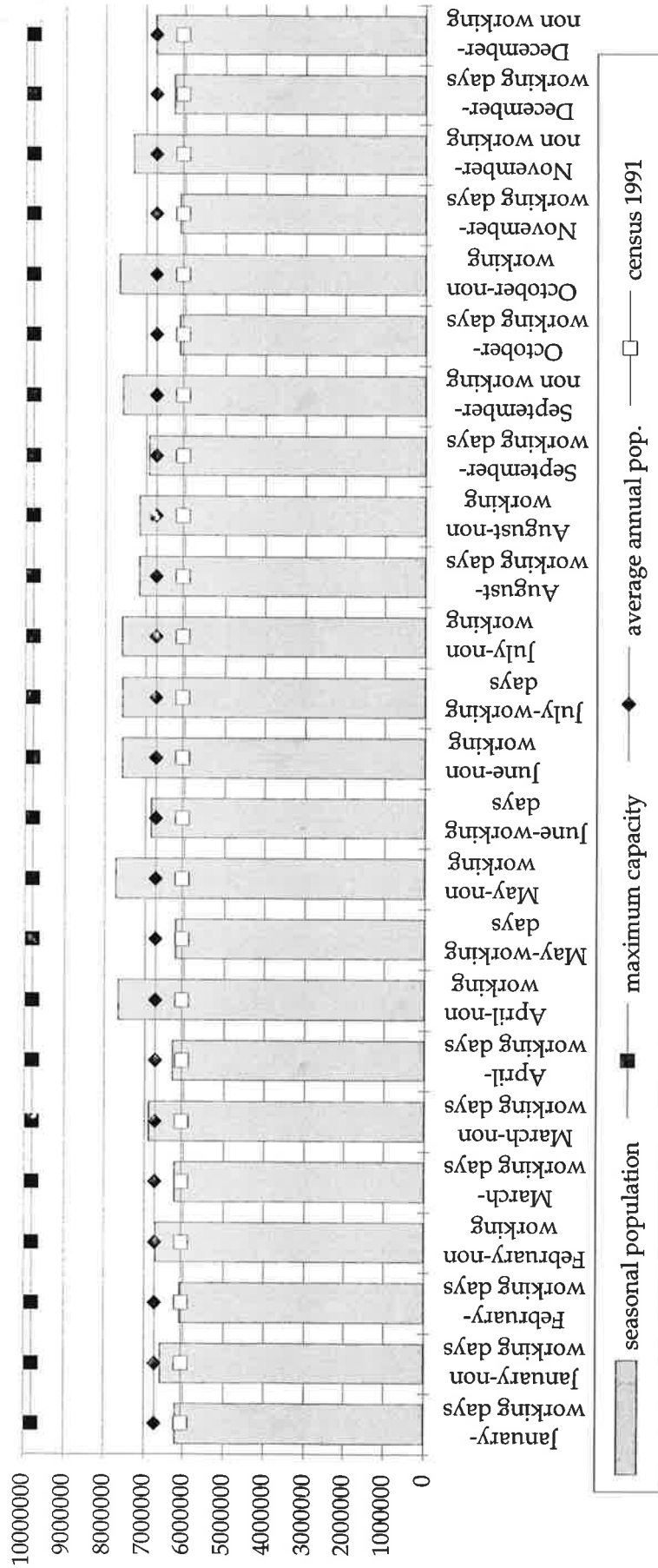


Table II. The ratios between different types of population and maximum capacity for the 41 *comarques*. 1993.

| | Census population/ maximum capacity | Average annual pop./ maximum capacity | Summer average pop./ maximum capacity |
|-------------------|--|--|---|
| Alt Camp | 57.06 | 65.03 | 75.60 |
| Alt Empordà | 24.92 | 56.24 | 80.29 |
| Alt Penedès | 60.33 | 68.45 | 74.18 |
| Alt Urgell | 51.70 | 63.34 | 73.16 |
| Alta Ribagorça | 33.95 | 52.67 | 66.73 |
| Anoia | 57.41 | 64.43 | 66.67 |
| Bages | 67.27 | 70.19 | 69.86 |
| Baix Camp | 43.16 | 57.81 | 69.70 |
| Baix Ebre | 33.67 | 60.45 | 80.53 |
| Baix Empordà | 24.21 | 56.56 | 82.65 |
| Baix Llobregat | 71.65 | 73.87 | 75.17 |
| Baix Penedès | 17.77 | 54.23 | 80.72 |
| Barcelonès | 81.72 | 73.79 | 67.65 |
| Berguedà | 52.42 | 65.59 | 75.03 |
| Cerdanya | 23.44 | 52.33 | 73.21 |
| Conca de Barberà | 48.24 | 62.43 | 76.96 |
| Garraf | 39.87 | 64.74 | 83.66 |
| Garrigues | 60.79 | 69.95 | 81.14 |
| Garrotxa | 62.36 | 67.31 | 71.46 |
| Gironès | 70.61 | 69.79 | 68.01 |
| Maresme | 50.85 | 69.41 | 82.52 |
| Montsià | 56.21 | 69.17 | 80.24 |
| Noguera | 56.56 | 60.97 | 65.24 |
| Osona | 67.29 | 72.44 | 73.20 |
| Pallars Jussà | 41.85 | 57.74 | 69.06 |
| Pallars Sobirà | 22.53 | 47.80 | 69.03 |
| Pla d'Urgell | 76.73 | 81.50 | 88.27 |
| Pla de l'Estany | 59.84 | 65.27 | 70.91 |
| Priorat | 40.87 | 56.02 | 72.33 |
| Ribera d'Ebre | 61.15 | 70.67 | 81.43 |
| Ripollès | 48.22 | 63.67 | 75.08 |
| Segarra | 59.61 | 69.71 | 80.85 |
| Segrià | 69.78 | 68.77 | 70.34 |
| Selva | 32.10 | 60.52 | 81.11 |
| Solsonès | 47.83 | 61.44 | 71.51 |
| Tarragonès | 41.97 | 63.38 | 79.45 |
| Terra Alta | 59.20 | 68.65 | 79.82 |
| Urgell | 63.38 | 72.72 | 82.14 |
| Val d'Aran | 15.71 | 57.38 | 82.69 |
| Vallès Occidental | 77.87 | 77.60 | 74.64 |
| Vallès Oriental | 66.36 | 71.64 | 72.73 |
| Catalunya | 61.81 | 68.93 | 73.87 |

120,000 hotels beds, the skiing season attracts around 3.5 million people every year to Catalan resorts, there are over 800,000 unoccupied dwellings, whether second residences or dwellings empty, but available for renting during the tourist season, at the time the survey was made (1 March 1991, low-season for tourism).

The varying distribution of population over the year

Figure I shows that population in Catalonia varies greatly over the year. This is due, precisely, to population mobility. Moreover, the variation in population distribution itself also varies greatly in Catalonia. In the summer months, the population of the coastal and mountain areas increases greatly, as second residences, hotels and camp-sites are occupied. During the winter sports season, there is also a large increase in population present in the Pyrenees on non-working days.

During these holiday periods, the industrial and urban areas of Catalonia, such as Barcelona Metropolitan Region and the cities of Lleida, Manresa, Girona, etc., and surrounding districts, register large population losses, as their inhabitants, in many cases, go to the zones where population increases.

Table II shows the ratios between different types of population and maximum capacity for the 41 comarques. or districts. of Catalonia and Catalonia as a whole. As can be seen, in Catalonia overall, from June to September almost 74% of maximum capacity is occupied by the average figure, whilst census population is under 62%. By district, it can be seen that those with percentage occupation very similar to census population, annual average and summer average are: Bages, Baix Llobregat, Gironès, Segrià and Vallès Occidental. It is noteworthy that there are only three where the ratio between average summer population and maximum capacity is lower than that between census population and maximum capacity: Barcelonès, Gironès and Vallès Occidental. Another important point is that the districts where there is a high ratio between census population and maximum capacity are those with important industrial or agricultural activity combined with little attraction for mass tourism, which continues to be drawn only to the sun and the beach.

Space does not allow here an analysis of the results for the 941 municipalities of Catalonia (in existence on 1 March 1991). However, two points stand out. Firstly, that of the 941 municipalities, only 44 have lower annual average population than census population. These 44 represent only 4.7% of the total municipalities, but account for 63% of the census population of Catalonia. Of these, twelve formed part of the old Metropolitan Corporation of Barcelona, another 13 are in Region I (including Granollers, Mataró, Sabadell and Terrassa), there are four large cities (Girona, Lleida, Manresa and Reus) and the remaining 16 are either

highly-developed municipalities forming part of large cities (Salt in Girona, Canovelles in Granollers, Santa Margarida de Montbui and Vilanova del Camí in Igualada, Sant Joan de Vilatorrada in Manresa) or are small rural municipalities.

The second outstanding point is that there are 57 municipalities where the seasonal population in July and August reaches practically maximum capacity. The total census population is 147,478 inhabitants, maximum capacity is 863,420 and their population in these two months is 861,349. Clear examples of this type of municipality are Castelló d'Empúries (3,637 registered inhabitants compared to 54,827 in summer), Castell-Platja d'Aro (4,923 and 68,856), Salou (7,624 and 110,825), Cunit (2,425 and 37,984), all on the coast, but also Vielha e Mijaran (3,109 and 22,177) and Puigcerdà (6,329 and 16,805) in the Pyrenees.

Conclusions

The mobility of individuals creates a space for daily use, living space. If there is one thing we can say about the mobility of individuals over a territory, it is that it is chaotic and irregular: the social, economic and demographic characteristics of individuals and the activities they perform according to these characteristics, make their mobility different and, therefore, its distribution varies over the day, the week or the year. Population mobility needs to be taken into account for the location of facilities of all types, for the population which is in a place for only a few days in the year also buys food, can become ill and need a doctor, consumes drinking water and produces waste, in exactly the same way as the census population. Population mobility has to be taken into account so that everyone can obtain and enjoy all the opportunities offered by any territory.

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