

forementioned issues of accessibility and sustainability that inspired Act 9/2003, because it is surprising that the Transport Infrastructure Plan of Catalonia concentrates its funds from these districts basically in the addition of a carriageway to the C-12 (*Eix de l'Ebre*, from Tortosa to Lleida through Móra, Flix and Maials) and to the N-340 (Barcelona-València). These will turn into the free alternative to the Mediterranean highway, which will run in parallel. In other words, two infrastructures: the first one (C-12) will be totally overvalued (as it will be explained in the next paragraph) and the second one does not answer to the will of structuring the territorial relationships in Terres de l'Ebre. Also, both would make the use of a private vehicle more attractive against the existing public transport.

The case of C-12 deserves special attention as, thanks to the characteristics of the Survey of Daily Mobility, a very interesting study can be done. Mobility surveys are known to bring a very complete description of the studied phenomenon as long as there is not an excessive territorial segmentation of the results. That is, they are very precise when explaining globally a country, a region or even a district; however, they cannot provide feasible information between two small towns or what concerns a specific infrastructure, since the sample becomes insufficient and the error linked to the results unacceptable. Except when coincidences like the following occur: C-12 is practically the only way of communication between Terres de Ponent and Terres de l'Ebre<sup>2</sup>, which are, in fact, two regions for which the Survey of Daily Mobility quantifies the flow that relates them on the basis of the sample obtained in the whole of Catalonia (more than 100,000 interviews with a margin of error of  $\pm 0,31\%$ ). Thus, the traffic flow<sup>3</sup> on the crossing between C-12 and the border of the two regions can be deduced with high precision, which is a very central spot of this highway (located between Flix and Maials).

It has been a long while since the Ebre river ceased to be the most important route of communications for these districts, the ones that Jesús Moncada describes so well in *Camí de sirga*. Table 6 shows how the highest flow between Terres de l'Ebre and Terres de Ponent on a weekend day is of 3,299 daily trips (both ways), very inferior to those that take place with other areas of Ebre. Letting the bus aside and assuming that all these trips are done by car through the C-12 (thus, adding the traffic flow of C-233), and adding the average occupation of 1.56 person/car,<sup>4</sup> a traffic flow of 43.1 vehicles/hour, each way, at the C-12 crossing point (between Maials and Flix) can be obtained. In other words, nearly one vehicle every minute and a half, which does not announce an imminent threat of traffic congestion and, therefore, makes the plan of adding a carriageway to the highway unnecessary.

This sort of calculation can be done in other locations according to the results of the Survey of Daily Mobility and satisfactory results will also be obtained. In order to prove this, this study can be compared to the C-12: the daily average according to working/weekend day that has been taken from the Survey of Daily Mobility is of 1,999 vehicles/day, almost identical to the average daily flow of 1,807 vehicles/day from 2001, obtained through the traffic directly registered on the road<sup>5</sup>.

What proposals can be made on new infrastructures on the basis of Survey of Daily Mobility and according to the aims of the Act on mobility? Firstly, the differential existent in the use of public transport in the area of Barcelona and in the rest of Catalonia indicates that citizens would be willing to use more services, should they exist. Therefore, regarding long distance journeys, improvements should be studied in the services offered by trains connecting the regions of Tarragona and Barcelona, which are the ones that nowadays show a major volume of trips. Secondly, time may have come to propose a railway service connecting Tortosa-Amposta-Sant Carles, which are the cities that gather the population of Baix Ebre and Montsià, two districts with a connection above 20,000 trips on a working day as well as on a weekend day (table 5).

Along these lines, it should also be analysed the possibility of extending this new railway service to the towns north of Castelló, which is still non-existent despite having a good part of the infrastructures (Mediterranean rail corridor) and showing a trips' flow equivalent to the one that connects it with the metropolitan region of Barcelona.

Finally, it also has to be stated that the Survey of Daily Mobility provides a very useful information to diagnose intercity mobility which is typically 77.3% of all trips on a working day and 69.4% on a weekend. Even though with the results used here concise data about these trips has not been shown, together with the Survey of Daily Mobility, it could illustrate some of the pending duties and could offer corresponding proposals.

1 But they have to reside in Catalonia, which is the area of study of the Survey of Daily Mobility. This factor of residence explains the imbalance between the number of trips in table 5 and the number in tables 1, 2 and 3.

2 With the exception of C-233 between Flix and les Borges Blanques.

3 Obtained in the sample of the Survey of Daily Mobility and therefore it includes inhabitants of every town in Catalonia.

4 Average number of travelers by car amongst the residents in Terres de l'Ebre on a weekend day. This average shows an almost identical number in all the regions of Catalonia, on a working day as well as on a weekend day.

5 DEPARTAMENT DE POLÍTICA TERRITORIAL I OBRES PÚBLIQUES. *Anuari DPTOP 2005. Carreteres (trànsit)* [on-line]. Generalitat de Catalunya <[http://www10.gencat.net/ptop/binaris/52\\_tcm32-35968.pdf](http://www10.gencat.net/ptop/binaris/52_tcm32-35968.pdf)>.

## DAILY MOBILITY IN THE COMARQUES CENTRALS

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### Introduction

Mobility studies play a fundamental role in knowledge of regional structures. Firstly, they make it possible to identify existing areas of relationships and the role of towns and cities in the organisation of the region and, on the other, they highlight the social mobility structures and the role of the different types of transport used by citizens. Despite this importance, the difficulty of obtaining this information is well enough known, and, beyond census data, there are hardly any studies offering sufficient data about territorial and social areas and structures. The Survey of Daily Mobility for Catalonia (2006) is, in this sense, a unique source of information as, for the first time, we have a large quantity of mobility data for the whole of Catalonia, allowing us a reasonably in-depth analysis of regional structures.

The Comarques Centrals region shows features determining the structures that generate mobility. On one hand, the towns and cities in this area are places with strong, diversified economic activity largely, but not exclusively, located in their immediate surroundings, configuring complex urban systems with consolidated social structures —one of the keys to the country's regional structures. On the other hand, although each of these towns and cities clearly articulates an area around it, communications between them are difficult. The lack of transversal infrastructures linking them together has been one of the outstanding challenges for the country, which is beginning to be resolved based on the construction of the transversal trunk road. In this area, the main road and rail infrastructures are those linking each of these towns and cities and their surroundings to the Regió Metropolitana de Barcelona. These two features mark and determine mobility structures, both in the sense of predominant areas of relationships and in the type of transport used.

### 1. Initial approach to mobility in the Comarques Centrals

An analysis of the basic features of the mobility of residents aged over four in the Comarques Centrals shows a dichotomy between mobility on working days and that at weekends and on public holidays, and this will be a constant throughout the different variables making up mobility as a whole. In general terms, mobility on working days is more complex, with a greater volume of people involved, more journeys made, a wider variety of reasons for them and greater appropriation of

the zone near the area of residence. By contrast, mobility at weekends and on public holidays shows fewer journeys and individuals involved, closely linked to personal reasons and with a stronger relationship with the nearby surroundings.

The features mentioned here follow the general mobility pattern for Catalonia as a whole. However, compared to the country as a whole, the Comarques Centrals show some slight differences, as there are fewer mobile individuals making, by contrast, more daily journeys.

The journeys made on working days divide almost equally between personal and employment reasons<sup>1</sup>. Despite the greater importance of the former compared to the latter: 53.2% as against 46.8%. Personal mobility shows greater complexity, in that it consists of a range of reasons: the most important of these concerns leisure<sup>2</sup> followed by shopping and, finally, personal errands.<sup>3</sup> Despite the diversity of reasons generating journeys on working days (both personal and occupational), the Comarques Centrals show a big pendulum effect, as outward journeys for an activity do not show very great differences (53.2 as against 46.8%). It is a slightly greater pendulum effect than for Catalonia as a whole. The data indicates that the pendulum effect in our region is due equally to occupational and personal journeys.

Concerning whether the journey is internal or connecting, the residents of the Comarques Centrals make 91.6% of journeys with origin and destination within the region, while 7.5% of journeys are connecting and a marginal 0.9% are outside the area. Among the connecting journeys, occupational ones are more important. As will be seen in subsequent sections in more detail, occupational mobility generates the majority of journeys to other territorial areas and, therefore, largely marks flows and relationships between areas.

Weekend and public holiday mobility is different from that on other days of the week for two main reasons, firstly because longer journeys are more numerous in percentage terms. In fact, the number of intra-municipal journeys made by residents is significantly lower (53.4%), journeys within the same municipality made by non-residents are slightly higher and journeys outside the area are more important, not only in percentage terms but also in absolute terms.

Secondly, the balance between the different reasons for travelling disappears. Mobility for personal reasons plays the leading role at weekends and on public holidays, as it includes 92.1% of the total. Also, within the range of reasons included under the label of personal mobility, we find a clear majority, excluding returns home, of leisure-related journeys (up to 30.7% of the total). Mobility on these days is, then, less complex.

## 2. The patterns of daily mobility

The analysis of mobility patterns in the Comarques Centrals cannot be separated from the regional structure and the existing range of transport. These elements combined give us mobility patterns that are firmly focused on the use of private vehicles, a notable permanence of journeys on foot and very low rates of public transport use.

As has just been mentioned, the majority means of transport during the entire week is the private vehicle. But it is interesting to analyse car use in greater detail depending on the day of the week. It can be seen that, despite the higher percentage use of cars at weekends and on public holidays, use of the private vehicle as driver is, in percentage terms, slightly lower, while the percentage of car use as a passenger is double compared to working days. So, during weekends and public holidays, cars are “fuller” than they are the rest of the week. This statement is confirmed with the vehicle occupation rate: 1.3 passengers/vehicle and journey on working days compared to 1.6 for weekends and public holidays. This differential use of the car depending on the day is not a unique feature of our region, in fact, it is reproduced throughout Catalonia.

The so-called non-motorised means of transport occupy second position in the usage share, representing 42.4% and 36.0% of journeys on working days, and at weekends and on public holidays, respectively. Within this group, journeys on foot show a lower rate at weekends and on public holidays, from which it can be deduced that walking is not associated with being a valid means of transport for leisure-associated personal mobility, which is the majority reason for journeys on those days. By contrast, bicycle use, although with very low values, shows greater use at weekends and on public holidays both in percentage and absolute terms, than on working days. In contrast to walking, cycling is used more as a form of leisure and relaxation at weekends and on public holidays than as a means of transport on working days. The lack of infrastructures allowing safe bicycle use and greater congestion of the road network during the week reduce the potential use of this form of transport.

Public transport is the means least used by residents of the Comarques Centrals and shows very low levels of use (4.9% on working days and a marginal 2.5% for weekends and public holidays), corresponding to the fact that the range of public transport in our region is clearly insufficient. This leads to a high level of mono-modality and a stages/journeys ratio close to 1. The three main means of public transport used are: the suburban rail service, the urban bus and the school bus. The first case includes both the Renfe suburban service and Catalan Government Railways (CGR). Between

the two of them, they reach a usage share of 1.3%, of which 0.8% corresponds to Rodalies-Renfe and the remaining 0.4% to CGR. As is already well known, the range of suburban rail services in our region follows a radial structure with respect to Barcelona and shows a reduction in services as we move away from the metropolitan centre. No suburban railway line links the counties within our region to one another and they are therefore mainly used for journeys to the Regió Metropolitana de Barcelona.

The most important form of public transport is the urban bus, which has a usage share of 1.1% on working days. In this case, it is a use very much focused on the territory, given the municipal nature of the service. In the Comarques Centrals, as well as Manresa (with five lines) where, because of the size of the population, local regulations establish the provision of collective urban transport for travellers; Vic and Igualada (with three routes for each town) also have their own urban transport. Concerning inter-urban bus transport, in the Comarques Centrals, routes linking the county capitals with their surroundings predominate, largely in Manresa and Vic and, to a lesser degree in Igualada. Finally there are Solsona and Berga, plus other long-distance routes linking the Pyrenees with Barcelona and strengthening these county connections. However, most of these routes have low daily frequencies and therefore absorb a lower percentage of mobility. Along the same lines, there is the almost non-existent transversal inter-county connection, which is reduced to a few routes with still lower frequency between Osona and Berguedà, between Bages and Osona and between Bages and Anoia. All this paints a picture of public transport communications very much based on the railways and with clear orientation towards the metropolis of Barcelona, encouraging the use of private transport, as the figures tell us. The current policy of increasing the range of public transport by buses to areas of economic activity will certainly, in the long or medium term, result in an increase in public transport for occupational mobility and a reduction in private transport. Still with a usage share of more than 1% is the school bus. In this case, unlike the previous one, usage is dispersed throughout the region and occurs in rural areas, aimed at a captive audience and connecting the small population centres of our region which do not have a big enough population of young people to offer secondary education (and probably in some cases note even primary) with council centres and sub-centres where school facilities are located.

Focusing on the means of transport used and the type of journeys on working days, general mobility patterns are observed depending on the area and the adaptations made in each case. Firstly it is in internal journeys within the Comarques Centrals region, that non-motorised modes show

higher rates than the general average (up to 45.7%), although not catching up with journeys made in private transport, which still exceed a 50% usage share. It is in these internal journeys in the area where public transport has the lowest usage rates (3.3%), a figure denoting the already mentioned scarce range of internal connections with this form of transport. Mobility at weekends and on public holidays generally follows the same patterns as the rest of the week, despite the greater importance of private vehicles and the absolutely marginal use (1%) of public transport.

Secondly, on connection journeys, non-motorised means practically disappear and, of course, use is concentrated on mechanical means of transport, which show higher usage rates: while private transport use on working days reaches 75%, public transport use reaches 21.8%. The latter figure is significant: in absolute figures, more connection journeys are made than internal ones. Given the insignificance of public transport by bus, as we have already mentioned, this figure basically reflects the range of railway services connecting our area with the Regió Metropolitana. These figures should, predictably, increase over the next few years, taking into account the widening of the range which is occurring (and which is planned to increase further) and which has not been included in the survey: the increase in frequency on the Igualada-Barcelona line and the improvements making the Montcada-Vic and Vic-Ripoll railway lines double-track ones, planned in the PITC 2006-2026, are two examples of this. Concerning mobility patterns for weekends and public holidays, once again the patterns described here are repeated, always following the trend that car use is even more overwhelmingly dominant (up to 88%), to the detriment of other forms.

Thirdly, on journeys outside the area on working days, the modal division is much more balanced: although private transport continues to be more commonly used, with 48.4%, both journeys on foot and on public transport increase to 24.8% and 26.8% respectively. These, then, are mobility patterns more typical of metropolitan areas, which are, in fact, where they mostly take place; so, mobility patterns are established more by the opportunities to use the different means of transport rather than by the personal choice of individuals. These patterns, however, change notably at weekends and on public holidays. Firstly, car use is lower, in percentage terms, than it is the rest of the week, and its usage share is the same as for non-motorised forms. By contrast, public transport is much less important (7%) than during the week. As will be seen in subsequent sections, these patterns correspond to the change in travellers' motives which, at weekends and on public holidays, are mostly personal. The use of non-motorised means is, then, clearly related to leisure.

In addition, mobility shows clearly differentiated patterns depending on the reason for the journey. In journeys to work or to study, on working days, mechanical means of transport are the ones that show higher than average rates: private transport exceeds a 64% usage share, while public transport reaches 7.0%. By contrast, personal mobility is made up of more local journeys where non-motorised modes predominate: the sum of walking and cycling accounts for more than half of it, with 54.1% of the total, while private transport is used on 42.9% of journeys and public transport on 3%.

### 3. The temporal dimension of mobility

The temporal dimension of mobility varies notably during the week depending on the main reasons for it on different days. While on working days journeys are marked by activities with a pre-established and rather inflexible temporal dimension, at weekends and on public holidays they enjoy the "free" timetable made possible, for the most part, by leisure activities. So, on working days, the mobility timetable is wider and, despite the existence of peak times and trough times, it is more constant throughout the day. By contrast, at weekends and on public holidays, journeys are concentrated into fewer hours and the differences between peak times and trough times are more notable.

Figure 1 shows how mobility on working days is divided into three peak times. Trough times, however, still show a high volume of journeys, because sixty-six thousand journeys still begin at the lowest point (between 4 and 5 p.m.). The peak times for total mobility are: between 8 and 9 a.m.; between 1 and 3 p.m. and between 5 and 8 p.m. These times correspond to different motives in each case: the first two to occupational mobility, while the last one of the day, lasting much longer than the others, corresponds to personal mobility. The complementary nature of the various mobility times, depending on the main reason for it, should be highlighted, as the peak times for both motives succeed one another, with occupational mobility coming first in time. This chronological succession explains why trough times do not mean the absence of journeys and why there are more than seventy thousand journeys beginning every hour in mid-morning.

The chronogram for weekends and public holidays (see figure 2) shows clearly differentiated features compared to the rest of the week and gives a totally different rhythm. The lack of occupational mobility means mobility times are marked by personal journey patterns.

If we distinguish between journeys to go and do an activity (occupational or personal) and returning home on weekdays (figure 3), we see that the morning peak time (between

8 and 9 a.m.) corresponds entirely to going to do an activity, largely occupational. The midday peak time corresponds to returning home—a combination of returning from work and the school population coming out. Finally, the evening peak time is the sum of outward and return journeys. If journeys to do an activity are analysed, we find there is a clear peak already mentioned between 8 and 9 a.m. linked to occupational mobility and a secondary, longer one running from 2 to 7 p.m., a confluence of significant volumes of occupational and personal journeys. Meanwhile, returning home has two outstanding peaks: the first and most accentuated one is from 1 to 2 p.m. and the second, not so accentuated but lasting longer, runs from 5 to 9 o'clock. Therefore, as has been indicated, mobility in the afternoon appears more complex, as it is made up of a mixture of all kinds of journeys: occupational, personal and returning home.

The distinction between movements to do an activity and returning home at weekends and on public holidays shows less complex time patterns than on other days of the week (figure 4). In this case, we can see how outward and return peak times succeed each other during the day, with clear, sharp peaks.

The average duration of journeys made by residents of the Comarques Centrals is not very great (almost 17 minutes). Occupational journeys last, on average, 16.25 minutes, with those made in order to go to work being slightly longer (16.95) than those to go and study (14.87). Personal journeys, by contrast, last longer on average: 17.26 minutes. However, this label conceals journeys with very different durations. The shortest, in terms of time, are the most everyday ones related to greatest proximity, while the longer ones are less everyday and involve greater distances.

The duration of journeys made at weekends and on public holidays is longer than on working days: 22.48 minutes. The reason can be found in the duration of leisure-related journeys, as the time of journeys to work is, on average, less than that on working days. These figures seem to indicate that leisure activities are associated with areas far from the everyday surroundings of the rest of the week.

### 4. The social structure of mobility

Gender is a variable that largely determines people's mobility. Women and men show different mobility patterns. While the former make more journeys for personal reasons, make greater use of the local area and move about more on foot, men are characterised by greater use of the car, for travelling further afield than their immediate surroundings and by the predominance of journeys to work.

Although the total number of journeys made by residents of the Comarques Centrals on working days is divided almost



equally between men and women, the reasons generating them are different (see figure 5). While the greater number of journeys to work is made by men (58.9%), women are responsible for the majority of personal journeys (57.1%).

As a general average, both men and women make the same number of journeys a day: the former 3.22 and the latter 3.19. But, if we also look at the age structure, significant gender differences appear. So, women in the “central” age groups, aged between 16 and 64, make more journeys a day than men, who move around more at the extreme ages, between 4 and 15 years and at over 65 years of age. The fact that women in the central age groups take on a “double working day” involves them carrying out a large number of journeys every day, both connected with paid work and personally.

Despite these general analyses, a more detailed view by age and motives provides clearer knowledge of this situation. In fact, notably different gender divisions in terms of going to work or to study can be observed, depending on age. Among young adults (aged between 16 and 29), the significance of journeys for each gender approaches the proportions shown by the structure of the population of the Comarques Centrals. But this “egalitarian” behaviour of occupational mobility reduces with age; between 30 and 64, almost two thirds of occupational journeys are made by men. Subsequent surveys should look at whether the behaviour of young adults is a change of trend, with this behaviour maintained as they get older, or whether, on the other hand, it is a division determined by age.

The use of means of transport is another feature which is, broadly, gender-related. Women make the majority of journeys on foot and by public transport.

This differentiated use of means of transport is related to a private use of areas that are further away, in the case of men, and nearer to the home surroundings, by women. Both the greater percentages of self-containment and the lower number of inter-municipal movements per person per day made by women confirm this situation.

Modal division also varies substantially depending on the age of the person involved: in the central age groups, greater use is made of cars, while walking is dominant at the “extreme” age ranges of the personal life cycle. However, gender-related behaviours go alongside these age-related ones. Analysing the mobility of residents of the Comarques Centrals on working days by age and gender, still more exaggerated behaviour patterns can be observed in the case of men (see figure 8). This behaviour can be summarised in:

- Majority use of the car by men in the central age groups (with percentages higher than 60%)

- A more concentrated and not so high peak in car use by women. The also maintain higher movement rates on foot throughout all age groups.
- Public transport use by women with highs and lows depending on age while men maintain descending use as the years go by.

Ultimately, in the Comarques Centrals mobility patterns reflect gender differences, which, as a general rule, show a more balanced division between modes in women.

## 5. Regional relationships

The area of study is in a central geographical position in Catalonia. This aspect promotes its role as a pivot, with the centre in Bages, between the different Catalan regions (apart from the Terres de l'Ebre) and it becomes a crossroads between the different axes of communication (the Llobregat, the Congost-Ter, Transversal and the future Diagonal trunk road). All this helps to define some features configuring the types and strengths of relationships with other regions. At the same time, the Comarques Centrals forms a region with internal development that is still incomplete, with the existence of three poles —Manresa, Vic and Igualada— that are important but which have weak relationships with one another. Barcelona's capacity for attraction, and relationships with its Regió Metropolitana as a whole, are, therefore, the predominant element of mobility in the Comarques Centrals.

In the Comarques Centrals there are one and a half million journeys on working days. These journeys are largely (92.6%) made by residents themselves, and the importance of non-residents is marginal. By contrast, in terms of connection journeys, importance is divided equally between residents of the Comarques Centrals and residents of other areas.

Concerning journeys at weekends and on public holidays, the overall daily number is lower but, for this kind of journey, the importance of non-residents is greater (both in absolute and percentage terms).

All these figures make it possible to show that the flows establishing regional relationships are two-way ones; residents and non-residents are equally important on working days and there is a greater presence of non-residents at weekends and on public holidays. They also indicate to us that the Comarques Centrals is an “open” permeable region, used by residents of other regions. However, this use does not mean non-residents experience the area very strongly because, as is shown in the table, their mobility basically involves connections; internal journeys, which would be an indicator of a stronger experience, are very much residual.

The territorial relationships of the Comarques Centrals are very largely focused on the Regió Metropolitana de Barcelona. The relationship with all the other regions is much weaker; only mobility involving the Comarques Gironines and the Terres de Ponent is at all important.

Journeys for occupational reasons are largely responsible for regional relationships on weekdays, particularly those established with the Metropolitan Area, which account for two thirds of trips. It is also in relationships with this area on working days where public transport is greater (21%) due to the greater existing range.

In relationships with other regions, the importance of journeys for work and for studies stands at around half of the total. The situation is turned on its head at weekends and on public holidays, when the importance of journeys for personal reasons is overwhelming.

County by county analysis makes it possible to see how the regional relationships of the Comarques Centrals are articulated along the various major routes crossing the country. On working days, these relationships decline in strength as the distance from our area of study increases. By contrast, at weekends and on public holidays the distance variable does not play such a decisive role and, as well as there being more journeys in absolute terms, trips are longer. Only the strength of flows involving Barcelona defies this logic, as its demographic importance leads to a bias in the analysis. Except for this region, it is with the neighbouring metropolitan counties: Ripollès, la Selva, Conca de Barberà, and with Garraf, Gironès and Tarragonès, where the closest relationships exist during the week. Concerning weekends and public holidays, relationships with counties with high populations and with tourist ones, such as Alt and Baix Empordà, Tarragonès and Baix Penedès are strengthened, while those with Ripollès, la Segarra and Conca de Barberà weaken. These figures indicate the double role of the Comarques Centrals: on one hand it is a leisure destination for residents of metropolitan counties (and this is why the more populated ones are more important) but it also generates flows to “tourist” regions, such as the coastal counties and, to a lesser extent, the mountain ones such as Ripollès.

### 5.1. Internal relationships

Inter-county relationships largely pivot on Bages, which is most important in a majority of connection flows and is the main origin and destination of journeys from other counties in the region. This fact can be explained both by the demographic importance of Bages and by its central position in the study area. Specifically, the strongest county flow on working days takes place between the counties of

Bages and Berguedà, with 9000 journeys, denoting the strong link between the two counties on the Llobregat axis. In this flow, almost 2/3 trips are for occupational reasons. The second largest flow in terms of number of journeys is between Bages and Osona, with more than 6000 journeys, and 2/3 of these are also for occupational reasons. The third largest flow involves Bages and Anoia, with around 4800, 60% of which are for occupational reasons. With Solsonès, it maintains a flow of more than 2800 journeys, 58% of which are for occupational reasons. This county is, in fact, the pivot of inter-county relationships.

As has already been mentioned, the other counties have smaller flows, a figure not merely corresponding to their lesser demographic importance. So, Osona has very much lower flows with other counties and only the flow with Berguedà is at all significant, with almost three thousand journeys.

As for Anoia, it also has a peripheral location in this region and its strongest relationships, as we have mentioned, are with Bages. It has very low flows with the other counties.

The regional structure of inter-county relationships of the counties in the Comarques Centrals is not so much different at weekends and on public holidays, but the strength of them and the reasons for them are. In fact, although the number of journeys originating in one county and remaining within it is greater on working days than at weekends and on public holidays, the total number of inter-county journeys is higher in the latter case than in the former. In all cases, the reasons for the vast majority of journeys are personal rather than occupational. The use of the region at weekends and on public holidays is therefore greater and leisure, for mobile individuals, is an activity carried out far from home and not in the nearby surroundings. In any case, with detailed observation, some changes in territorial relationships can be seen. One of these is the reduction (the only one in the entire region) of journeys between Anoia and Bages as, at weekends and on public holidays, journeys between the two counties fall by almost half. By contrast, at weekends and on public holidays, the flow between Bages and Osona appears strongly, with almost fifteen thousand journeys, coming to be the strongest flow in the whole region, to the detriment of Bages-Berguedà which, although it does increase compared to working days, involves only twelve thousand seven hundred daily journeys at weekends and on public holidays.

## 5.2. County dynamics

As has been made clear throughout the analysis of the figures, lower capacity to retain internal flows at weekends and on public holidays and the increase in

connection journeys is translated into lower self-containment indices (both in terms of counties and municipalities) on these days than on working days. However, there is no direct correlation between county self-containment and municipal self-containment: the internal structure of the county, the delimitation of urban systems and their relationship with the municipal boundaries are some of the variables explaining the different levels of flow retention in municipal territories.

Concerning county self-containment, this is around 90%, with the minimum figure in the county of Anoia (84.9%) and the maximum in Bages (91.7%). These figures fall by ten percentage points at weekends and on public holidays, with the minimum in Solsonès (75.3%) and the maximum of 85.3% in Berguedà.

Municipal self-containment shows very much lower indices than county ones and, for the Comarques Centrals as a whole, stands at 64.2% on working days and at 53.4% at weekends and on public holidays —the lowest in Catalonia.

The county of Osona shows high county self-containment, above the average for the region both on working days and at weekends, but, by contrast, one of the lowest rates of municipal self-containment. It is, therefore, a county with strong internal cohesion and, at the same time, shows the existence of some powerful urban systems revolving around large municipalities such as Vic, Torelló and Manlleu, which have the capacity to attract and generate flows of occupational mobility between one another.

By contrast, the county of Anoia shows low rates of both county and municipal self-containment. It is a county in which only Igualada represents a strong centre of attraction to structure the region (Calaf's role is clearly at another level). The low level of county self-containment is basically due to this county's strong relationships with the Regió Metropolitana de Barcelona and the weakness of journey flows to other counties in the same region. This situation can be explained by various factors: firstly, there is the gradual incorporation of southern Anoia into the MRM and, secondly, the considerable crisis of productivity of the county, with the destruction of the textile industry that has traditionally been the main economic activity. Internal crisis is therefore combined with greater integration with the surrounding areas, particularly with the Regió Metropolitana. Concerning the low level of municipal self-containment, the small size of the municipality of Igualada explains the fact that a large number of that town's areas of activity are actually in neighbouring municipalities. In this way, inter-municipal flows are generated which, in the majority of cases, involve short journeys in terms of time and space but which, because of the municipal map, are classified as inter-municipal flows.

Bages shows high levels of county and municipal self-containment. In this case, the strong articulation of the territory of the county around its capital, Manresa, and, at the same time, its importance, should be highlighted, along with the resulting high levels of municipal self-containment.

Solsonès shows high levels of self-containment —the second highest county rate and highest municipal rate. It is, therefore, a county with few inter-county or inter-municipal territorial relationships because of dominant economic activities related to its immediate surroundings, such as the primary sector or the tertiary sector based on rural leisure.

Berguedà shows a slightly lower county self-containment rate than the average for the region and notably higher municipal self-containment than the average for the Comarques Centrals. In the first case, relationships articulated around the Llobregat axis maintain strong flows with Bages and, to a less degree, with Osona, but, at the same time, the importance of Berga in the county as a whole gives it high levels of municipal self-containment.

## 6. Conclusion

The general mobility patterns in the Comarques Centrals show features similar to those of non-metropolitan Catalonia as a whole, such as the use of the private vehicle for around half of all journeys, a slightly lower percentage of journeys on foot and an almost marginal use of public transport. In addition, mobility patterns by gender maintain the differences in habits of the country as a whole, according to which women have more balanced mobility patterns than men, whose habits are strongly focused on car use.

However, as a characteristic feature, the Comarques Centrals are the region with the lowest municipal self-containment rates of all Catalan regions. Here we have a region which, *a priori*, shows considerable openness encouraged by an administrative structure dominated on one hand by small municipalities and by the existence of quite cohesive urban systems covering more than one municipality.

In addition, our area of study has a central geographical position in Catalonia and serves as a pivot, the centre of which is Bages. Based on this positioning, the Comarques Centrals establish territorial relationships with the surrounding regions weakening as the physical distance increases. However, different strengths of relationships can be established which, in decreasing order, would be: the Regió Metropolitana de Barcelona, the counties bordering our area of study, Gironès and Segrià, and the rest of the region.

However, it must be borne in mind that territorial relationships change in strength

and even territorial depending on the day of the week in question; at weekends and on public holidays it is a stronger relationship caused by leisure-generated mobility and in which the distance factor is a less decisive element when it comes to establishing relationships.

As for internal relationships, we find they are centralised on Bages and, probably, on Manresa, while the other counties in the region have very weak and sometimes non-existent relationships with one another. The lack of central axes for the whole region and the fact that various transport systems have stronger communications with other areas, especially the Regió Metropolitana, certainly have something to do with this situation.

- 1 Homeward journeys have been added to each of the main reasons.
- 2 Under these labels we find leisure/fun, going for a walk and visiting friends.
- 3 Here we find errands, visits to the doctor, unregulated education and eating other than as a leisure activity.

## DAILY MOBILITY IN THE TERRES DE PONENT

Carme Bellet  
Josep M. Llop

### 1. General daily mobility characteristics of the population

According to the data provided by the Survey of Daily Mobility (2006), during 2006 the 323,323 residents of the Terres de Ponent (Western Regional Area) made a total of 6,830,078 weekly journeys which averages out to 21.13 journeys per person per week. Although average individual mobility is very similar across the different regional areas under study, it varies in terms of concentrations of journeys.

These figures show that, in general, mobility in the Terres de Ponent is less intense than in other territories, together with the Comarques Centrals (Central Regions) and the Comarques Gironines (Girona Regions). We can see that in the Terres de Ponent the average number of journeys made on weekdays is 3.33, while on weekends the daily average falls to 2.24 journeys per person.

On weekdays the average number of journeys per person<sup>1</sup> is close to averages for Catalonia as a whole (3.38 per person per week), but on weekends the population of the Terres de Ponent, together with the Comarques Centrals, make the least journeys.

### 2. Motives for travelling

Throughout all the regional areas, figures for mobility linked to personal motives

(shopping, accompanying another person —children or elderly—, leisure, etc.) are higher than those for work or study related mobility (occupational mobility). In the Terres de Ponent, however, it should be noted that the journeys made to and from work / place of study account for 47.4% of all journeys, a percentage which is slightly higher than that recorded for other areas, and in any case significantly higher than the figure for Catalonia as a whole (45%).

So, figures for journeys undertaken for personal motives are quite moderate compared to those for other areas. Shopping (7%), leisure activities (5%) and accompanying other people (4%) are the main motives for journeys on weekdays. In the Terres de Ponent figures are considerably lower for journeys related to leisure, going for a walk or taking advantage of free time compared to other regions. Accordingly, while the average for journeys related to personal reasons (leisure, taking a walk, visiting friends or family) in Catalonia account for 32.1% of all journeys, the corresponding figure for the Terres de Ponent is only 10.8%. In contrast, however, the motives which are more relevant are: accompanying other persons, personal business, doctor/hospital and attending informal training courses (i.e. those offered in community centres etc., with no official qualification).

The significant proportion of elderly people in the Terres de Ponent, compared to the age structure in other territories, the lower level of mobility for part of the population, and the limited public transport services in the region, offer a likely explanation for the higher percentages for these motives.

In the Terres de Ponent, the reasons for making journeys at the weekend are of a more leisure-oriented nature. Leisure pursuits (which alone cover 16%), going for a walk or visiting family together, account for 34.5% of journeys made on weekends.

The significant figures for journeys home (more than 46.5%) in the Terres de Ponent, confirms the pendular nature of mobility: that is, citizens do not combine their journeys, but rather, for example, leave home to go to work and then return home; or go out shopping and then return home<sup>2</sup>.

### 3. Use of transport modes

The evident inadequacy of public transport (lack of services and networks or the limitations of existing services) in the Terres de Ponent explains why a car is the prevalent mode of transport, accounting for 48.6% of journeys on weekdays and 59.1% on weekends. Furthermore, figures for the number of people travelling in a car are very low: 1.20 on weekdays and 1.34 on weekends.

However, journeys are also undertaken via non-motorised modes of transport with

notably higher figures than for other areas. Walking or using a bicycle in the Terres de Ponent account for 46.4% of journeys on weekdays, while figures for Catalonia as a whole are 45.1%. Walking accounts for 45% of all journeys. These are significant differential features of this area.

On weekends figures for non-motorised transport means fall to 41%, a tendency which can also be seen for public transport use, which drops from the already marginal 6% on weekdays to 2.2% on weekends.

On weekdays privately owned vehicles are the most common means for getting to and from work, while journeys for personal motives are mainly resolved via non-motorised means (on foot/by bicycle). On weekends the figures for private transport use increase significantly whatever the reason for the journey, which, as already stated, are related to longer journeys which go beyond municipal boundaries.

Journeys in the Terres de Ponent are usually undertaken by only one transport mode, single-modal. If we define a stage as each of the trip trajectories which require changing from one transport mode to another, then journey-stage relationships are 1.02 (for weekdays), and 1.01 (for weekends).

### 4. Journey times and concentrations

The hourly breakdown of journeys shows the rhythm and concentrations of journeys according to motives for the journey. Thus, work-related journeys (work and study) on weekdays are generally concentrated in two time zones: 7:00-10:00 a.m. and from 5:00-8:00 p.m. Rhythm and concentration, however, change outside the metropolitan area. For example, in the Terres de Ponent, a significant feature is the volume of journeys at midday (from 1:00 p.m. to 4:00 p.m.), for the main part people returning home from work or place of study. However, a further interesting aspect here is that occupational mobility (work or study) not only governs individuals' personal agendas but also those of others and how they make use of the territorial space. One example of this is the motive "accompanying another person" which, as stated earlier, is a significant feature of the Terres de Ponent. The concentrated volumes accordingly generated are mainly found in time zones related to class and work schedules (8:00-9:00 a.m. and 4:00-6:00 p.m.).

Mobility governed by personal motives, as opposed to occupational mobility, is much more even throughout the day, generating more continued use of public space. This is particularly evident on weekends when journeys are much more even and more concentrated than on work days. One of the findings of this survey has been to reveal the numbers and relative importance of personal mobility, but another important aspect that needs