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Source: Mountain Research and Development, 27(2):130-137. 2007.
Published By: International Mountain Society
DOI: 10.1659/mrd.0840
URL: http://www.bioone.org/doi/full/10.1659/mrd.0840

Mountain Research and Development Vol 27 No 2 May 2007: 130–137 doi:10.1659/mrd.0840

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Although the European Union has invested important subsidies in European mountain areas since the 1980s, the influence of these subsidies on the economy and society of these regions has so far not been analyzed. For this reason, we conducted a quantitative analysis of the effects of public policies on the development of the Central Pyrenees from 1986 to 2001. During this period, around €170 million (US$ 226.3 million) was invested in development of the Central Pyrenees through the Common Agricultural Policy and Regional Policy. However, in our analysis of correlations between several socioeconomic factors, we found that the number of inhabitants, farms, and employees in the primary and secondary sectors had decreased, while the tourist sector was becoming a major part of the economy. These findings seem to indicate that public policies had little effect; but although our analyses revealed that the various subsidies did little to promote structural improvement, they were important for supporting inhabitants (for example farmers) in the Pyrenees, because they are a form of complementary income, they allow communities to maintain farming activities, and they favor small enterprises linked to tourist activities—thus preventing depopulation. As the Pyrenees have little capacity for endogenous development, we argue that the current public policies should be maintained for the foreseeable future.

Keywords: *Rural development; demographics; public policies; European Common Agricultural Policy (CAP); Mediterranean mountains; Pyrenees; Spain.*

Peer reviewed: *November 2006* ***Accepted:*** *February 2007*

Introduction

Over the past century, the Spanish Central Pyrenees, like other Spanish mountain regions, have suffered from a severe recession due to depopulation and socioeconomic disintegration, which took a particular turn for the worse in the 1950s (Lasanta 1990). Over the next few decades, traditional economic activities (agriculture, livestock husbandry, and forestry) began to disappear and mountainous regions, like the nearby countryside, became areas that urban dwellers relied upon for leisure activities and natural resources (water and fuel). Many mountain territories became isolated or even abandoned, and natural processes intensified (for example, increased growth of shrubs and forest), leading to changes in biodiversity, soil conservation, and landscape structure (MacDonald et al 2000; Poyatos et al 2003; Romero-Calcerrada and Perry 2004; Vicente-Serrano et al 2004). Through the 1970s, no organized efforts were made by public administrations or mountain dwellers to halt this decline. However, beginning in the early 1980s, public institutions and private enterprises initiated efforts to improve the dynamics of growth in mountain areas. For example, national and regional groups proposed laws to favor the development of mountain regions. When Spain became a member of the European Union in 1986, measures to improve conditions in mountain areas increased considerably. However, it is not entirely clear that these efforts have had a major positive impact on the socioeconomic context in mountain areas.

Among Spanish mountain regions, the Central Pyrenees are a good example of economic marginalization and the effects of various public policies. This area has suffered from depopulation, land use changes, revegetation, being set aside, and a transition from primary to tertiary activities (García-Ruiz and Lasanta 1993). In terms of public policy, the Central Pyrenees are part of the 'less favored' areas included in the European Union's Common Agricultural Policy (CAP) and its 5b Objective for Rural Development, and fall under European initiative programs such as LEADER (Liaison Entre Actions du Développement Economique Rural) and INTERREG (European Union Community initiative for border areas; both are framed in Regional Policy directives). LEADER is an initiative of the European Union to promote the mobilization of rural population by financing new enterprises through investment. INTERREG was developed by the European Union in 1990 through subsidies and loans with low interest to favor the development of border regions. These programs have underpinned large-scale subsidization of the Pyrenees region over the past 2 decades.

More than 20 years have passed since the inception of the first rural development measures in the Central Pyrenees, within the framework of European, national, regional, and local policy measures. It is important to determine the territorial and socioeconomic effects of these measures and examine whether they have been helpful in re-energizing the region. In the present study, we examine the effects of public policies on the socioeconomic background of the Central Pyrenees. The study period runs from 1986, the year that Spain joined the European Union, until 2001, the date of the last Spanish population census. This timespan covers the first 2 periods of Structural Funds (1989–1993 and 1994–1999), as well as official data related to population and the primary sector.

TABLE 1 Public policies favoring rural development in the Central Pyrenees.

	Measures	Objective	Application period	Law (EU)	Type
CAP	**Mountain Compensatory Allowances (MCA)**	Compensation for disadvantageous location	1987–1999	268/75	Subsidies
	Early retirement	Continued farm operation	1991–1999	2078/92	Subsidies
	Structural improvements	Improvement of farms (accounting systems, improvement plans, professional qualification, etc)	1987–1999	797/85 2328/91 950/97 1257/99[a]	Investment
	Agroenvironmental measures	Conservation of natural resources	1996–1999	2078/92	Subsidies
	Livestock (sheep)	Conservation of farms	1987–1999	2529/2001	Subsidies
	Livestock (goats)	Conservation of farms	1987–1999	2529/2001	Subsidies
	Livestock (cattle)	Conservation of farms	1987–1999	1254/1999	Subsidies
Regional Policy	**LEADER 1**	Rural development	1989–1993	1992 Structural Funds Reform 2081/93 2082/93	Investment
	LEADER 2	Rural development	1994–1999		Investment
	INTERREG 1	Integration of marginal and border regions	1989–1993		Investment
	INTERREG 2	Integration of marginal and border regions	1994–1999		Investment
	DOCUP	Rural development	1994–1999	2081/93 2082/93	Investment
	Regional incentives	Economic development	1989–1999	50/85[b]	Investment
Green Tourism Plans	**1990**	Tourism diversification	1990	113/86[b] 69/97[b]	Investment
	1992	Tourism diversification	1992		Investment
	1996	Tourism diversification	1996		Investment

[a]The EU Legislation R.1257/99 covers structural improvements, early retirement, MCA, agroenvironmental measures, and some other objectives. The subsidies as of 1999 were not considered.

[b]The law covering this measure is based on Spanish law, not on European Union legislation.

The study area

This study focuses on the Central Pyrenees (or the Aragonese Pyrenees), an area of 10,227.31 km^2 that was declared an Agricultural Mountain Zone (AMZ) by the Regional Law enacted on 23 February 2001. This sector is a part of the Aragon region, which is one of 17 Spanish regions with a Regional Government, known as the Diputación General de Aragón (DGA). In 2001, the Aragonese Pyrenees had a population of 53,441 individuals distributed among 105 municipalities of different size. The 3 largest municipalities (Jaca, Sabiñánigo, and Graus) had a combined population of 23,080 (43.2% of the total population), while the 71 smallest municipalities together comprised 11,268 inhabitants (21% of the total). The relatively low population density (5.2 inhabitants/km^2) and the uneven spatial distribution of the population mean that inhabitants of a large portion of this territory do not have adequate access to infrastructures and services (Faus and Higueras 2000).

During the 20th century, the Central Pyrenees underwent important economic transformations, including a high rate of depopulation and extensification of farming. This process was largely triggered by improvements in communications and farming techniques and the relatively easier lifestyle found in the lower areas of the nearby Ebro valley, with good access, proximity to population centers, and fertile soils amenable to mechanization and irrigation. At present, viable farming is in evidence pri-

TABLE 2 CAP, Regional Policy, and Green Tourism subsidies for rural development in the Pyrenees (1987–2000). (Source: DGA)

	Measures	Total amount in €; (€ 1 ≈ US$ 1.33)	Individual beneficiaries	Municipalities
CAP	Mountain Compensatory Allowances (MCA)	11,158,184	2733 (1991)[a]	102 (1999)
	Agroenvironmental measures	287,366	235	47
	Early retirement	229,588	52	32
	Structural improvements	1,089,051	160	43
	Livestock (sheep)	65,171,307	1524	101
	Livestock (goats)	2,114,434		
	Livestock (cattle)	13,354,884	725	57
	TOTAL	**93,404,818**	**–**	**–**
Regional Policy	LEADER 1 (1990–1993)	7,643,354	89	30
	INTERREG 1 (1991–1993)	9,807,317	11	29
	DOCUP (1994–1999)	7,049,229	2616	–
	LEADER 2 (1994–1999)	28,363,642	526	71
	INTERREG 2 (1994–1999)	9,153,414	16	33
	Regional incentives (1989–1998)	6,654,632	–	12
	TOTAL	**68,673,020**		
Green Tourism Plans	1990	4,973,915	46	27
	1992	1,370,281	22	17
	1996	642,009	12	4
	TOTAL	**6,986,205**	80	48

[a]The total number of people profiting from the MCA and livestock subsidies was based on the year with the highest number of approved application forms. Data on agroenvironmental measures are from 1999 (the only year for which this information was available). The early retirement and farm improvement data represent the total number of people benefiting from these measures.

marily in lower valleys that can be cultivated by tractors, whereas all the slopes have been abandoned. In terms of livestock, sheep and cattle populations dropped markedly following the so-called "transhumance system crisis" (Puigdefábregas and Fillat 1986; García-Ruiz and Lasanta 1993). During the cold season, sheep traditionally migrated to the barren land and fallow lands of the Ebro valley. Thus, over the course of the 20th century, the sheep population in the basin dropped by more than 80%. Today, livestock exercise minimal grazing pressure on large areas of the Pyrenees, especially on the low slopes, and sheep and cattle are largely concentrated on cultivated lands and summer pastures (García-Ruiz and Lasanta 1990).

Data and methods

Data for 1981–2001 were obtained from a number of different sources. Population counts were obtained from the census taken by the Instituto Nacional de Estadística (INE 2006). Information on land use and cattle tallies was extracted from the agricultural census of the INE (2006) and from Economic Activity Tax records (Government of Aragon or DGA); the latter was extracted manually from individual index cards in the archives of the Government of Aragon. Data related to the secondary and tertiary sectors were obtained from different economic surveys of Aragon developed by the DGA and the Administration of the Province of Huesca (see www.aragon.es; www.ces.aragob.es; www.ine.es/serv/estadist.htm; www.camarazaragoza.com; all accessed on 6 February 2007). We focused primarily on information related to economic subsidies earmarked for inhabitants of the Pyrenees through the Common Agricultural Policy (CAP) (year-by-year and measure-by-measure; data were obtained through systematic consultation of personal records of each applicant). As the

TABLE 3 Socioeconomic trends in the Aragonese Pyrenees over 2 decades.

Parameters	1981	2001	Trend
Total population	56,702	53,743	▼
Population density (inhabitants/km^2)	5.5	5.2	▼
Ageing index	0.9	2.2	▲
Male tax	1.1	1.1	=
Number of farms	10,892	6086	▼
Livestock farming in animal units	53,821	77,613	▲
Employment per sector (% of total)			
Agriculture	34.8	21.0	▼
Industry	19.8	16.4	▼
Construction	10.9	13.7	▲
Services	34.5	48.9	▲
Total fiscal licenses	**5195**	**7030**	▲
Industrial fiscal licenses	515	419	▼
Building fiscal licenses	690	958	▲
Services fiscal licenses	3990	5653	▲
Tourist function (Defert's TF)	120	260	▲
Accommodation (# of beds)	68,232	139,192	▲

Spanish laws on privacy do not allow us to have access to personal data, it is impossible to specify whether these measures have different outcomes on women and men. Most of this information was obtained from various economic and agricultural departments of the DGA and the Administration of the Province of Huesca.

The data obtained from the different public organizations were digitized, creating a data base that was used to perform bivariate analysis by means of calculation of correlations (R-Pearson). This technique was calculated in the spatial domain (for instance, subsidies received in each municipality were correlated with each socioeconomic variable). Correlation analysis is a simple statistical tool widely used to determine the degree of association between 2 variables. It has the advantage of revealing significant associations according to the degrees of freedom selected and also the sign and strength of associations. Therefore, the analysis allowed us to determine how the spatial distribution of one socioeconomic variable (for instance, the evolution of total population or the livestock census) was affected by spatial differences in the total subsidies. The use of more complex techniques, such as Principal Component Analysis, made interpretation of the results more complicated without leading to significantly different insights (Laguna 2004).

Results

Rural development measures and investments

The various rural development measures were administered through the European Union, the National Administration, the Regional Administration, and various provinces. The European Union and the National Administration joined through the CAP and regional incentives, while regional and provincial administrations contributed by providing economic assistance to the tourist sector. Table 1 shows the measures applied in the Central Spanish Pyrenees to favor its socioeconomic development. It includes the objective of each measure, the years in which each measure was applied, its regulations, and the purpose of each measure: either to subsidize with the purpose of maintaining currently productive infrastructure, or to invest with the purpose of starting new development alternatives.

The economic measures made available through the CAP may also be grouped into 2 types (Table 2): first, those oriented toward structural policy (for instance, Mountain Compensatory Allowances [MCA], farm improvements, environmental measures and conservation of agricultural land, and early retirement); and second, those related to prices and market policy (for instance, subsidies for producers). The total

amount of economic assistance given to the Pyrenees between 1987 and 2000 exceeded €93 million (US$ 123.8 million), most of it in the form of livestock subsidies and exchange policies versus structural policies. In fact, sheep subsidies accounted for almost 70% of total investment, and bovine subsidies accounted for another 14%. Mountain Compensatory Allowances (MCA) were also important, accounting for approximately 12% of the total. As shown in Table 2, most of these measures aimed at increasing the income of farmers rather than farm improvements.

We were unable to obtain data on financial support through regional policies from 1989 to 1993. From 1994 to 1999, however, the Structural Fund for Agricultural Guarantee and Guidance (EAGGF) invested more than €68 million (US$ 90.5 million; Table 2). Of these measures, the Single Programming Document had the widest spatial diffusion: each municipality within the study area was the focus of at least one measure, with measures distributed according to population density (Laguna 2004). INTERREG II was also characterized by wide spatial distribution, but these measures consisted of surveys and studies rather than concrete actions and were thus less effective than rural development initiatives. The next most widespread measure, LEADER II, affected 71 municipalities (67.7% of the total). Whereas LEADER was relatively restricted in terms of spatial distribution, it dispensed more than €28 million (€10 million from Public Administration [US$ 37.3 and 13.3 million, respectively]), making it a level of assistance comparable to that of INTERREG II.

An analysis of public initiatives for these measures revealed that in the European Union LEADER program, up to 60% of the investment distributed through LEADER II was mobilized by private participation, while only 10% of regional incentives were privately funded. LEADER has implemented a specific program for each group, whereas the Single Programming Document has a different operating system. The latter is used for concrete actions that do not have a leading function, such as those seen in the regional incentives or on INTERREG.

In the case of tourism, the Regional Government and the Administration of the province of Huesca implemented several measures in an effort to improve tourism in areas that did not benefit from alpine ski resorts. From 1986 to 1997, the DGA enacted a law (*Decree 113/86*) designed to regulate tourist accommodations, while the administration of the province of Huesca maintained its own rural tourism program, called Green Tourism Plans, until 1996. Both these plans were aimed at improving the use and profitability of endogenous resources in areas with weak tourism, thus increasing local incomes by facilitating connections between the primary and tertiary sectors. In order to achieve these goals, the Green Tourism Plan measures focused on rebuilding accommodations and improving marketing related to tourism in the Pyrenees.

As shown in Table 2, the 3 Green Tourism Plans (1990, 1992, and 1996) invested almost € 7 million (US$ 9.3 million), benefiting 80 beneficiaries in 48 municipalities. Moreover, subsidy measures amounted to a total of € 92.3 million (US$ 122.9 million), whereas investment measures totaled about € 77 million (US$ 102.5 million).

Socioeconomic changes in the Central Pyrenees (1981–2001)

Table 3 shows the basic parameters we used to evaluate the extent of developmental change in the Pyrenees from 1981 to 2001. During this 20-year period, the population of the Central Pyrenees region decreased by around 3000 inhabitants (5.6% of the total population). While this is consistent with the general decline in population seen over the past century, it is less severe than the population decrease witnessed between 1960 and 1981, when population in the Pyrenees declined by around 40%. In contrast to this overall drop in population, however, Aragon actually gained inhabitants. Population density in the Pyrenees decreased from 5.5 inhabitants/km^2 in 1981 to 5.2 inhabitants/km^2 in 2001. Notably, major differences were seen on the municipal scale. Only 3 towns (Jaca, Sabiñánigo and Graus) had a population density of over 10 inhabitants/km^2, while many other municipalities had barely 1 inhabitant/km^2.

In addition to observed depopulation, we also noted that the ageing index—the number of people aged 65 and over per 100 youths under age 15—in the Central Pyrenees increased from 0.9 to 2.2. These data indicate a preponderance of aged people compared to younger individuals. Laguna (2004) reported that in 2001, no municipality had an ageing index of less than 0.5, which represents an equal balance between young and old individuals and, of the municipalities examined, only 2 (Benasque and Sesué) had indexes between 0.5 and 1. Moreover, 9 municipalities (those harboring local governments and/or ski resorts) had indexes between 1 and 2, while the rest had ageing indexes >2. Male tax records showed a slight preponderance of males (1.1 males to each female).

The number of farms decreased from 10,892 to 6086 over the period, mirroring and/or predicting the decreases in agricultural employment. Notably, however, the livestock census showed an increase of 23,792 Animal Units (AU), indicating that each present farm was substantially larger in 2001 than in 1981. Between 1982 and 1999, the sheep population grew from 324,130 to 439,110, an increase of 35.4%. In the same period, the cattle population grew by 57.3%, moving from 20,115 to 31,658 cows (INE 2006).

TABLE 4 Correlations between rural development measures and selected socioeconomic parameters. Bold figures represent significant values at a confidence interval of 95%.

Pearson's R Parameters	Regional subsidies	Agricultural subsidies
Population in 2001	**0.515**	**0.679**
Demographic evolution 1981–2001	0.109	–0.039
Ageing	**–0.232**	**–0.231**
% employed in agriculture	**–0.359**	–0.122
% employed in services	**0.247**	0.113
Accommodation (beds)	**0.271**	**0.575**
Defert's TF	–0.021	–0.108
Fiscal licenses	**0.479**	**0.680**
Personal income	**0.334**	**0.386**
Animal units	**0.417**	**0.759**
Number of farms	**0.382**	**0.658**

Examination of employment statistics revealed that the number of employees in the primary sector had decreased, while that in the tertiary sector had increased. The percentage of employees involved in agriculture and livestock decreased from 34.8% in 1981 to 21% in 2001, while the percentage of those involved in services increased from 34.5% to 48.9%. Similarly, the percentage of employees involved in industry decreased (from 19.8% to 16.4%) while increasing in construction (from 10.9% to 13.7%), probably reflecting decreases in local artisan activities and increases in home restoration and construction of second homes.

The number of fiscal licenses increased considerably between 1981 and 2001 (from 5195 to 7030), probably due to the growth in tourism. Consistent with this, the number of industrial licenses decreased from 515 to 419 during this period, while those for building increased from 690 to 958 and for services from 3990 to 5623. In the industrial sector, the role of subsidies has been very weak, as revealed by the decline in the number of people working in this sector and in fiscal licenses.

Finally, the tourist function (given as Defert's TF: [total number of tourist beds / total population] x 100; Laguna 2004) more than doubled, from 120 to 260, and accommodation capacity increased from 68,232 beds to 139,192 beds over the period studied.

The effects of rural development measures on changes in the Central Pyrenees

In order to evaluate the effects of the enacted measures, we calculated correlations (Pearson's R) between regional/agricultural measures and socioeconomic parameters (Table 4).

Our analyses identified positive relationships between regional policy actions and population, employment in the tertiary sector, accommodation, fiscal licenses, per capita income, livestock population, and number of farms. Negative correlations were established between regional policy actions and ageing index, and percentage of employees in the primary sector. These correlations were relatively weak for the 8105 cases studied, but were significant at a confidence level of 95%. Thus the regional measures seem to have contributed—at least at a low level—to maintaining the human and livestock populations, supporting the services sector (ie employees and fiscal licenses) and personal income growth. However, it appears that regional measures were not allocated as often in ageing municipalities and municipalities with weaker primary sectors.

When we considered the effects of agricultural measures, our results were similar to the above findings when declines in the number of agricultural employees were excluded. Indeed, the positive correlations were slightly higher, particularly in the case of livestock population and number of farms, which makes sense, given that these measures focused primarily on livestock subsidies (Laguna 2004).

The effects of public policies on 2 parameters relevant to the primary sector are depicted in Table 5. Similar to the above results, we detected small but significant correlations in some cases, showing that while the measures did not prevent a decrease in the number of farms, they did support increases in the livestock population. The highest values corresponded to direct measures supporting livestock, followed by early retirement. In contrast, agricultural structural improvements, MCA, and 5b Objective measures did not affect these parameters.

Finally, we examined correlations between tourist parameters and 3 possible sources of tourist development (Table 6), including total population, the tourist potential measured by the Warzinska Index (Laguna 2004), and rural development measures. Correlation analysis showed that population size had a large influence on the number of fiscal licenses ($r = 0.972$) and on the number of beds ($r = 0.800$), but no influence on tourist tax or percentage of employees in the tertiary sector. The tourist potential showed a significant positive relationship only with the percentage of employees in the tertiary sector, whereas rural development policies correlated positively with accommodation and fiscal licenses.

Discussion and conclusions

Since 1986, more than €170 million (US$ 226.3 million) has been invested in efforts to improve conditions

TABLE 5 Correlations between rural development subsidies and development of the primary sector. Bold figures represent significant values at a confidence interval of 95%.

Pearson's R Primary sector measures	Farming	Livestock census
Agroenvironmental measures	**–0.220**	**0.332**
Early retirement	**–0.350**	**0.366**
Structural improvement of farms	0.017	0.044
Mountain Compensatory Allowances (MCA)	0.058	0.048
Livestock subsidies	**–0.385**	**0.477**
LEADER	**–0.221**	0.058
5b Objective	–0.080	0.019

in the Aragonese Pyrenees. More than €90 million (US$ 119.8 million) has come from the CAP, while around €70 million (US$ 93.2 million) was mobilized through regional policies, with the rest being used to support tourism. However, despite these investments, our analysis revealed that public policies played only a modest role in rural development. In fact, between 1981 and 2001, the Aragonese Pyrenees continued to lose inhabitants and the remaining population increased in age.

A similar evolution is evident in other Spanish mountain regions. García-Pascual (2006) points out that in 1981 there were 3,883,900 inhabitants in the 2686 municipalities of the Spanish mountains. In 2001 the population had decreased to 3,495,300 inhabitants, representing a decline of 10%. This highlights the small influence of public policies in maintaining population. Nevertheless, it is possible—to a certain extent due to the maintenance of tourism—to directly influence some farms and favor small firms related to tourism, thereby helping to diminish outmigration and attract young people with countercultural lifestyles (Laguna and Lasanta 2003; Cánoves et al 2006). In this sense, Rizov (2004) indicates that subsidies paid to local family enterprises not only improve family income but also contribute to the economic growth of the whole municipality.

These measures have had greater influence in the primary sector, especially on livestock farming. Population growth highlights this point. These amazing increases, which are a definitive break with past trends (García-Ruiz and Lasanta 1990), can only be explained by subsidies for livestock farming. In this sense, in a recent study Ammar (2006) points out that subsidies totaled around 21–29% of sheep farming income. Without these subsidies, most farms in the Pyrenees would probably disappear due to low profitability. On the other hand, subsidies have not been able to maintain the number of primary farms. Some of these are managed by old people who will have no heirs after their retirement. Their farms have been incorporated into other farms run by younger people. This is a very positive development, because the greater the size of a farm the more competitive it is. This, in turn, guarantees its maintenance (Manrique et al 1999).

The role of each subsidy analyzed in the evolution of the Central Pyrenees was quite different. Laguna (2004) points out that the most effective subsidies in the primary sector are those directly allocated to livestock farming. Structural improvement, early retirement, and environmental actions have had tenuous effects. Meanwhile, Mountain Compensatory Allowances have hardly been useful. Regional incentives have helped to bring tourist activity to municipalities far away from the main tourist resorts, although their influence has been minimal (Laguna and Lasanta 1999). The 5b Objective and INTERREG policies have had a positive role in relation to tourist activities, but no influence on the industrial sector.

Laguna (2004) also points out that investment measures are more efficient than those only related to subsidies. The latter have only a "welfare" purpose, as they complement income until retirement, while investment measures help to improve productive structures and make them more competitive. In this sense, in the

TABLE 6 Correlations between subsidies and parameters related to the tertiary sector. Bold figures represent significant values at a confidence interval of 95%.

Pearson's R Parameters in tertiary sector	Defert's TF	Accommodation (# of beds)	Fiscal licenses	Employment in services sector (%)
Rural development measures	–0.028	**0.304**	**0.513**	0.247
Tourism potential	**–0.333**	0.052	0.141	**0.397**
Population	–0.048	**0.800**	**0.972**	0.273

future it will be necessary to focus on investment measures rather than mere subsidies. On the other hand, it would be important to use more endogenous potentials (especially resources and social capital, see Mühlinghaus and Wälty 2001) in order to improve the efficiency of external subsidies.

In other regions the role of public policies has not been evaluated quantitatively, although there are some qualitative studies that show little effect (Esparcia and Paniagua 2006). In fact, the period from 2000 to 2006 has been investigated for the whole region of Aragon, where the Central Pyrenees are located (Frutos et al 2006). The authors of that study point out that impacts have been minor. The absence of coordination between measures and between public administrations seems to be the cause (Frutos et al 2006). There are few studies on this issue at the European scale, although the European Spatial Planning Observation Network (ESPON, see www.espon.eu; accessed on 6 February 2007) may be an important tool for understanding the role of development measures.

In summary, most rural development measures put in place in the Central Pyrenees from 1981 to 2001 have had little effect. For the most part, these measures have been used to subsidize mountain farmers' income until retirement, rather than to improve structures and increase yield. However, subsidies have ensured the continuation of some highland farms and small enterprises, thus maintaining a minimum population in the Central Pyrenees, albeit one that is ageing and in some cases suffering from economic depression.

In all, we can confirm that public measures put in place between 1981 and 2001 in the Spanish Central Pyrenees have had minor but sometimes significant effects on an area that has little capacity to generate an endogenous development process, due to a general lack of private enterprise, initiative, inhabitants, and informed marketing channels. Thus, maintenance of these external measures appears warranted, in an effort to maintain the agricultural sector and the natural resources of this mountainous region.

ACKNOWLEDGMENTS

This work has been supported by the following projects: "Processes and sediment balances at different spatial scales in Mediterranean environments: Effects of climate fluctuations and land use changes" (CGL2006-11619/HID), and "Vegetation recovery and erosion on fire-affected lands. Integrated analysis of fire severity and environmental parameters using remote sensing and GIS" (CGL2005-04863/CLI), funded by the CICYT.

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