

Article

# Effects of Legal Designation and Management of a Multiple-Use Protected Area on Local Sustainability

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**Abstract:** The designation of protected areas (PAs) entails environmental, social, and economic effects to local stakeholders through access restriction to natural resources. We used a mixed methods research framework that combines time series analysis and stakeholder surveys to elicit objective and subjective effects of legal and managerial designation of Sierra Cabrera-Bedar Natura 2000 site on local sustainability in south-eastern Spain. Firstly, 47 environmental, social, and economic variables for which official time series data were available were assessed using a multiple-paired-Before-After-Control-Impact research design, where “Impacts” were: (1) legal designation of Sierra Cabrera-Bedar as a Site of Community Importance (SCI); and (2) management implementation of the site as an Special Area of Conservation (SAC). The two municipalities having most of their territories in Sierra Cabrera-Bedar SCI/SAC were selected as ‘Cases’, whereas two similar municipalities outside the PA were chosen as ‘Controls’. Additionally, 13 local organisations pertaining to 11 socioeconomic guilds from case municipalities were surveyed on their perceived effects of the designation Sierra Cabrera-Bedar as an SAC on 28 social and economic variables. The effects of legal and managerial protection of the site on local sustainability were unclear although greater SAC sustainability is suggested, even though limited time series availability for the SAC period increases uncertainty. Local organisations perceived mostly limited and negative socioeconomic effects from SAC designation. Disagreement between statistical and perceptual results suggests use of time series analyses for accurate assessment of socioeconomic effects of PAs in Spain.

**Keywords:** stakeholder survey; organisation; BACI design; time series; Natura 2000; Spain

## 1. Introduction

Protected areas (PAs) are clearly defined spaces aimed at the long term conservation of biodiversity and associated ecosystem services and cultural values [1]. They usually protect biodiversity by applying a legal regime that forbids or restricts some human activities that have a negative impact on the environment, such as construction or mining [2,3]. PA management is considered a key factor to the effectiveness of PAs, as it enforces regulations and helps to achieve conservation objectives that may not be accomplished otherwise [4,5] due to unawareness or conscious infringement [6,7]. PA regulations usually affect existing human activities in the area, with local stakeholders and primary sector stakeholders experiencing the most negative effects, chiefly in developing countries [8–11]. International policy requires governments to account for fair cost-benefit sharing and equity issues from PA designation [12]. More precisely, the contribution of Natura 2000

sites to socioeconomic development remains understudied [13]. Despite numerous existing techniques to assess the socioeconomic effects of conservation activities, attribution of such effects to PAs remains challenging [14], with a number of specific techniques being recently developed [15,16].

In contrast to reserves, a category of PA whose regulation forbids all or most human activities on the grounds of biodiversity conservation [1], multiple-use PAs are regulated by lenient regulations that allow most human activities and just restricts or forbids those with the greatest impact on biodiversity. European Union's Natura 2000 sites are examples of such PAs [17] that seek to achieve sustainable territorial development [13,18]. The Natura 2000 Network is the largest internationally coordinated network of PAs for the conservation of biodiversity [19]. It is made of Sites of Community Importance (SCIs), Special Areas of Conservation (SACs), and Special Protection Areas (SPAs). SCIs are aimed at the conservation of species and habitats of European conservation concern, except wild bird species. They derive from the Habitats Directive [20]. According to it, Member States must 'upgrade' legally designated SCIs to actively managed SACs within six years of the official designation of sites as SCIs. SPAs are intended at the conservation of wild bird species in Europe and derive from the Birds Directive [21].

We hypothesize that SCI designation has probably entailed some environmental, social and economic changes at local scale as a result of legal enactment, whereas SAC designation has probably made an additional difference with regard to natural resource use by nearby human populations as a result of full implementation of Natura 2000 regulations. Hence, the objective of this study was assessing the local environmental, social, and economic effects of the designation of an SCI, later on a SAC, in south-eastern Spain, a sub-regional biodiversity hotspot [22], as a means of exploring the effects of legal designation and active management of Natura 2000 sites on local sustainability.

## 2. Materials and Methods

### 2.1. Study Area

The SAC Sierra de Cabrera-Bedar is a 33,706 hectare Natura 2000 site located in the Almeria province, in south-eastern Spain (Figure 1). It was designated as an SCI in July of 2006 and as a SAC in January of 2015. It expands over the territories of seven municipalities: Bédar, Los Gallardos, Lubrín, Lucainena de las Torres, Mojácar, Sorbas and Turre. Forest land uses (chiefly scrubland made of *Quercus coccifera*, *Chamaerops humilis*, *Pistacia lentiscus*, *Rhamnus alaternus*, and *Retama sphaerocarpa*) extend over 76% of the SAC, whereas agricultural uses cover 20% and urban, infrastructural, and industrial uses cover around 1%. Almost 90% of its territory is privately owned. There are important gypsum mining and small game activities. Non-irrigated agriculture exists, whereas irrigated agriculture and animal farming is residual. The area has a typical Mediterranean climate, with hot summers and cold winters, and an average precipitation of between 300 mm and 600 mm per annum. Sierra Cabrera-Bedar is a geologically and biologically rich area, with numerous endemic flora species, nine flora species of conservation concern, ten fauna species of conservation concern and 30 habitats of Community interest, seven of which are priority habitats for European biodiversity [20,23].

Following official designation as an SCI, provisions in the Habitats Directive started to fully apply on the site by mid-2006 [20]. When designated a SAC, a management plan for the site accounting for economic, social, and cultural aspects was officially passed in March of 2015 [23], as national [24] and international regulations require [20]. The management plan has unlimited validity although modifications may be made after its evaluation. Sierra Cabrera-Bedar SAC was chosen as our study area on three grounds: (1) it was recently designated as a SAC. This facilitated more valid comparison of the current and previous status of the site as an SCI by stakeholders' recall and the existence of time series of socioeconomic data; (2) it did not overlap with any other PA category. Thus, confounding factors from protection regulations and management were minimised and the possible socioeconomic effects could be more validly attributed to the SCI or SCA designation categories [25–27]; (3) it was designated in an inland, rural area. This makes it more likely that possible effects of the PA are more intense and

easily reflected in organisations' stances and official statistics than in more socioeconomically dynamic areas, such as peri-urban areas or coastal areas [28].



**Figure 1.** Location of Sierra Cabrera Special Area of Conservation and case and control municipalities.

## 2.2. Common Methods

A mixed method approach based on the Integrated Marine Protected Areas Socio-Economic Assessment framework [15] that included statistical time series analysis and stakeholder surveys was used to elicit objective (gathered in official statistics) and subjective (perceived) effects of Sierra Cabrera-Bedar designation as SCI and SAC on local sustainability.

Of the seven municipalities partially covered by Sierra Cabrera-Bedar PA, the two of them with the greatest proportion of their territories included in the PA were chosen as our cases: Turre (78% of whose territory is included in the PA) and Bedar (71%; Supplementary 1 in Supplementary Materials), for being the ones most likely affected by legal designation and active management of the PA. Figure 2 shows a methodological outline of the study.

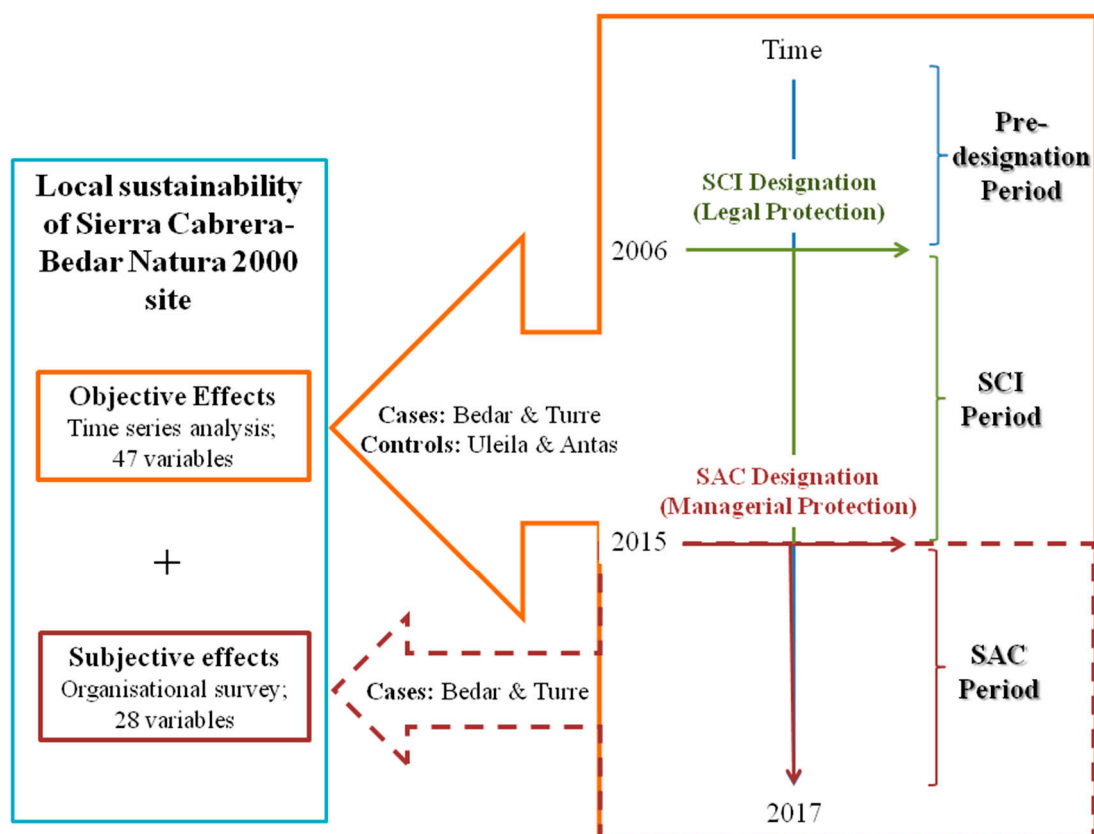


Figure 2. Methodological outline of the study.

### 2.2.1. Time Series Analysis

A quasi-experimental multiple, paired Before-After-Control-Impact research design was applied to validly compare mean values of environmental, social and economic variables before and after the designation of Sierra Cabrera-Bedar as an SCI (initial legal designation) and as an SAC (initial management of the site) in two municipalities inside the PA (cases) and in the two most similar municipalities outside the PA in terms of population, size and land uses that could be found (controls; Table 1) [9,29].

Table 1. Preliminary case-control comparison (based on official figures and own calculations).

Municipality	In Protected Area	Type	Size (km <sup>2</sup> )	Population in 2016	Forest Area (%)	Agricultural Area (%)	Closest Control-Case Distance (m)
Bédar	Yes	Case	47	885	80.18	15.11	
Uleila del Campo	No	Control	38	871	49.31	45.73	10,500 (with Bédar)
Turre	Yes	Case	108	3351	81.12	13.77	
Antas	No	Control	99	3159	59.78	29.51	0 (with Bédar)

Relative change in 7 environmental variables, 21 social variables, and 19 economic variables were assessed for case municipalities and control municipalities at three time points: 'Before' designation of Sierra Cabrera-Bedar as an SCI; 'After' the designation of the site as an SCI; and 'After' designation of Sierra Cabrera-Bedar as an SAC. Thus, two time periods were assessed for each variable when possible: SCI period and SAC period (Figure 2).

Time series for the 47 variables were obtained from official regional statistics at municipality scale [30]. Data for as many years as available were retrieved for each variable. Per head proportions were computed for valid comparisons among municipalities when appropriate. For each variable, data until 2006 (year of the site's designation as an SCI) was considered 'Before' data. Data from 2007 until 2015 (year when Sierra Cabrera-Bedar was designated an SAC) was considered 'SCI' data. Data since 2015 was considered 'SAC' data. Mean values were computed for each variable ( $x$ ), municipality and period. Then, relative change (i.e.,  $((t_{2x} - t_{1x})/t_{1x}) \times 10^2$ ) between the two assessment periods was computed when data availability made it possible. Finally, mean change values for case and control municipalities were calculated and compared. When  $t_{1x}$  was zero, we qualitatively assessed the variable's relative change as  $>0$  if there was a positive change or as  $<0$  if there was a negative change. We interpreted 'positive change' as change that increased the sustainability of the variable within each dimension where it was placed and assessed period (e.g., reduced electricity consumption—for the environmental dimension; increased population—for the social dimension; greater number of enterprises—for the economic dimension).

Descriptive analysis comparing the percentage of environmental, social, and economic indicators that changed more positively, negatively or equally between case and control municipalities by period was done. In order to confirm differences in relative changes of the variables by protection period and type of municipality and explore patterns of difference, One-Way ANOVA tests or Kruskal–Wallis tests were performed by each sustainability dimension (environmental, social, and economic) after checking the normality and homoscedasticity of the variables for an  $\alpha = 0.05$ . When transformation of originally non-normal variables by  $\log_{10}$  resulted in the loss of many data due to initially negative mean values of those variables, Kruskal–Wallis tests were used.

### 2.2.2. Organisational Survey

We designed a semi-structured questionnaire with four compulsory questions and one optional question using Survey Monkey software (Supplementary 2 in Supplementary Materials). Questions referred to two different items: (1) Main characteristics of respondent organisations; and (2) Organisational stances on the social and economic effects of the designation of Sierra Cabrera-Bedar SAC on the municipalities where it was designated. Sixteen social variables and 12 economic variables that may be affected by the designation of PAs at local scale were identified after a non-exhaustive literature review (Supplementary 3 in Supplementary Materials). That review was also used to identify 34 socioeconomic guilds that represent a comprehensive social and economic picture of rural settings in Spain. We classified those guilds in six socioeconomic sectors: primary sector, secondary sector, tertiary sector, quaternary sector, institutional sector, and miscellaneous sector. We aimed at identifying a balanced representation of positively affected and negatively affected organisations in order to reduce reporting biases on PA socioeconomic effects [14]. Obtaining a census of the social and economic organisations pertaining to those guilds in the two municipalities where Sierra Cabrera-Bedar SAC covered the greatest area was challenging, as to our knowledge no such census exists. Thus, we used two online business repositories in order to get local organisational data (economic activity, phone number, and email address) from Bedar and Turre [31,32]. For each guild (e.g., construction), the first three organisations that were shown on those repositories in each municipality were systematically selected. Thirty-two organisations from 14 guilds were identified (Supplementary 4 in Supplementary Materials). Primary sector organisations could not be found. Some inaccuracies of the data in those repositories related to incorrect classification of organisations' economic activities or wrong contact information reduced the organisation sample.

We pre-tested the questionnaire in a small, ten-person sample and amended it according to their remarks. Then, we administered it as an online survey in June of 2017. Firstly, participants were contacted by telephone and asked to fill-in the survey providing the views of their organisations in order to maximize result representation [33]. From the 18 organisations that could be contacted by phone and invited to take part in the survey, some declined to participate, chiefly on the grounds of

limited time or relevance of the topic to their activities. Finally, 13 organisations from 11 guilds agreed to participate in the survey. Two weeks were given as the deadline to fill in the survey and two email reminders were sent to non-respondents.

Responses to closed-ended questions on the perceived socioeconomic effects of Sierra Cabrera-Bedar SAC on the municipalities where it was designated were numerically coded according to the following ordinal scale: “large decrease” = −2; “moderate decrease” = −1; “No effect” = 0; “moderate increase” = 1; and “large increase” = 2. Then, descriptive statistics were computed. We assessed the degree of agreement on the effect of Sierra Cabrera-Bedar SAC designation on a number of local socioeconomic variables among stakeholders using the relative coefficient of variation (CV; the standard deviation divided by the absolute value of the mean), as done previously [15] and complemented it with a Pearson correlation test between the mean and standard deviation values of the survey variables, after checking the normality of the variables ( $\alpha = 0.05$ ). For communication purposes, the range of continuous mean values of the perceived intensity of PA effects was split into equal intervals using quartiles: 0–0.50/0–0.50 (no effect: 0–3% increase/decrease of the variable’s baseline value); 0.51–1 (slight effect: 3–6% perceived increase/decrease); 1.01–1.50 (moderate effect: 6–10% perceived increase/decrease); and 1.51–2 (large effect: >10% perceived increase/decrease).

Relative change results from 19 socioeconomic indicators of the SAC period time series analysis were matched with survey indicators’ results according to their equal or very similar meanings (Table 2). To assess the degree of agreement of results between both methods, a Spearman correlation test was performed after checking the non-normality of the variables. The significance level was 0.05.

**Table 2.** Cross-method, meaning-based indicator matching.

Time Series Indicator (SAC Period)	Survey Indicator (SAC Period)
Population density	Number of residents
Population over 44 years old	Residents’ age
Number of public learning centres	Number of local education infrastructures
Electricity consumption	Residents’ environmental awareness
Number of public libraries	Local cultural, recreational and sport offer
Number of cinemas	Local cultural, recreational and sport offer
Number of public health centres	Number of local health infrastructures
Number of pharmacies	Number of local health infrastructures
Per head income	Residents’ income
Local council’s budget surplus	Local council’s budget
Local council’s per head income	Local council’s budget
Unemployment <sup>1</sup>	Local employment
Number of commercial establishments	Number of local enterprises and businesses
Number of enterprises	Number of local enterprises and businesses
Public transport vehicles	Number of local transport infrastructures
Beds in hotels	Local tourist activity
Beds in apartments	Local tourist activity
Beds in camps	Local tourist activity
Beds in rural guest houses	Local tourist activity

<sup>1</sup> Negative sign for comparison.

### 3. Results

#### 3.1. Time Series Results

Statistically significant differences between case and control municipalities were not found for any sustainability dimension or period. Mean relative change in cases and controls by dimension and variable are shown in Supplementary 5 in Supplementary Materials. However, large differences between cases and controls occurred for a number of environmental, social, and economic variables. Positive sustainability changes prevailed, especially in the SAC period (Table 3).

**Table 3.** Sustainability indicators showing a twofold or larger difference between cases and controls by period.

Sustainability Dimension	Indicator	Period	Relative Change of Cases Compared to Controls	Interpretation Regarding Sustainability
Environmental	Electricity consumption	SCI	Greater	Worse
Social	Immigrants	SCI	Fewer	Worse
Social	Foreigners	SCI	Fewer	Worse
Social	Young women	SCI	Fewer	Worse
Social	Health centres	SCI	Fewer	Worse
Economy	Hotel beds	SCI	Fewer	Worse
Environmental	Per head winter water consumption	SCI	Less	Better
Social	Population density	SCI	Greater	Better
Social	Public libraries	SCI	More	Better
Social	Mortality	SCI	Less	Better
Social	Selective waste containers	SCI	More	Better
Economy	Local council's income	SCI	More	Better
Economy	Local council's investment	SCI	More	Better
Social	Emigrants	SAC	More	Worse
Economy	Local council's income	SAC	Less	Worse
Economy	Local council's investment	SAC	Less	Worse
Economy	Unemployment	SAC	Less	Worse
Economy	New service enterprises	SAC	Fewer	Worse
Environmental	Electricity consumption	SAC	Less	Better
Social	Population over 44 years old (%)	SAC	Less	Better
Social	Immigrants	SAC	More	Better
Social	Public learning centres	SAC	More	Better
Social	Public libraries	SAC	More	Better
Social	Public health centres	SAC	More	Better
Economy	Per head net income	SAC	More	Better
Economy	Credit establishments	SAC	More	Better
Economy	Hospitality businesses	SAC	More	Better
Economy	Beds in hotels	SAC	More	Better
Economy	Beds in rural guesthouses	SAC	More	Better

Cases behaved similarly to controls after SCI designation, whereas most indicators improved more in the cases after the designation of the SAC (Table 4).

**Table 4.** Case-control comparison by sustainability dimension and protection period.

Period	Environment		Society		Economy	
	SCI (n = 6)	SAC (n = 2)	SCI (n = 17)	SAC (n = 12)	SCI (n = 11)	SAC (n = 17)
Variables where change was better in cases (%)	50.00	100.00	41.20	58.30	36.40	47.10
Variables where change was worse in cases (%)	50.00	0.00	41.20	25.00	45.50	41.20
Variables where change was equal to controls (%)	0.00	0.00	17.60	16.70	18.20	11.80

### 3.2. Organisational Survey Results

#### 3.2.1. Response Rate and Responding Organisations

Six organizations from six socioeconomic guilds and four sectors completed the survey (Table 5). The response rate was 46%.

**Table 5.** Responding organisations.

Organisation	Guild	Sector	Preliminary Stance on Protected Areas
Quesos Sierra de Bedar	Manufacturer	Secondary	Neutral
Construcciones y Reformas Índalo sl	Construction	Secondary	Negative
Arimet 1970 sl	Real state	Tertiary	Negative
SEPRONA	Ranger	Institutional	Positive
Turre Town Council	Governance	Institutional	Positive
Bedar Sostenible	Environmental NGO	Miscellaneous	Positive

### 3.2.2. Organisational Perception of the Effects of Sierra Cabrera-Bedar SAC Designation on Affected Municipalities

There was a statistically significant negative correlation between mean perceived change values and standard deviation values ( $r_{(28)} = -0.48$ ;  $p = 0.01$ ). The only socioeconomic variable that was perceived to vary (decrease) moderately after the designation of Sierra Cabrera-Bedar SAC was “Residential construction”, whereas “Local council’s budget” was perceived to decrease slightly. A number of other variables including “Number of local health infrastructures”, “Number of local security and justice infrastructures”, “Number of local transport infrastructures” and “Number of local enterprises and businesses” were perceived to decrease almost slightly. In contrast, “Residents’ environmental awareness”, “Number of local (non-commercial) associations”, and “Restrictions to local property rights” were perceived to increase slightly on average, although variation in responses was moderate to high (Table 6).

**Table 6.** Local stakeholder perception ( $n = 6$ ) of the local socioeconomic effects of the designation of Sierra Cabrera-Bedar Special Area of Conservation. SD: Standard deviation; CV: Coefficient of variation

Social Indicator	Mean	SD	CV
Residents’ environmental awareness	0.50	0.55	109.54
Number of local (non-commercial) associations	0.50	0.55	109.54
Local cultural. recreational and sport offer	0.33	0.52	154.92
Local traditions	0.33	0.52	154.92
Residents’ participation in local environmental decisions	0.33	0.52	154.92
Number of local health infrastructures	−0.50	0.84	167.33
Number of local security and justice infrastructures	−0.50	0.84	167.33
Restrictions to local property rights	0.50	1.05	209.76
Number of local education infrastructures	−0.33	0.82	244.95
Health of residents	−0.33	0.82	244.95
Number of residents	−0.33	1.03	309.84
Scientific and/or technical research activities in/on the site	0.25	0.96	382.97
Educational degree of residents	−0.17	0.98	589.92
Number of regulation breaches & sanctions	−0.17	0.98	589.92
Vulnerability of local populations to natural disasters	−0.17	0.98	589.92
Residents’ age	0.17	1.33	797.50
Economic Indicator	Mean	SD	CV
Residential construction	−1.20	1.10	91.29
Local council’s budget	−0.60	0.89	149.07
Number of local technological infrastructures	0.33	0.52	154.92
Local tourist activity	0.20	0.45	223.61
Residents’ income	−0.40	0.89	223.61
Number of local enterprises and businesses	−0.50	1.22	244.95
Number of local transport infrastructures	−0.50	1.22	244.95
Local taxes	0.33	0.82	244.95
Local bureaucracy	0.17	0.41	244.95
Local quality of life	−0.33	0.82	244.95
Local employment	−0.20	1.10	547.72
Price of local products and services	0.00	0.00	

### 3.3. Degree of Agreement between Survey Results and Time Series’ Results

No significant correlation was found between subjective change and objective change for the SAC period.

## 4. Discussion

### 4.1. Objective Effects: Time Series Analysis

The legal designation of Sierra Cabrera-Bedar as an SCI did not have clear effects on the two municipalities with the greatest proportion of their territories in the PA. Its designation as an SAC did not seem to have had overall effects on local sustainability either. It is thus unlikely that legal or



managerial protection of Sierra Cabrera-Bedar has had broad environmental, social, or economic effects in the rest of the municipalities with smaller proportions of their territories in the PA. Socioeconomic effects of PAs of different signs have been shown in some resource-dependent developing countries at sub-national scale [34] and at local scale [9]. It is, however, unlikely that multiple-use PAs in wealthy countries with more diversified economies such as Spain have an impact on local sustainability, chiefly on its social and economic dimensions [15,35].

There are, however, some hints that local SAC sustainability is likely greater, as suggested from previous studies elsewhere in Spain [36], even though time series for the SAC period were limited and the lack of covariate analyses reduces certainty on causality [9]. To begin with, most sustainability indicators improved more in cases than in controls in this period. Also, the number of variables that experienced large change between cases and controls was similarly positive for the SCI period but more than doubled in the SAC period even though important variables such as unemployment worsened. Nevertheless, a clear sustainability pattern due to protection could not be found.

A number of factors may contribute to blurring differences in local sustainability among our study periods. Firstly, some natural resource management in Sierra Cabrera-Bedar according to sectoral regulations (e.g., forest regulations, agriculture regulations, protected species' regulations) has occurred for many years. Such actions were structured and expanded according to the requirements of the site's management plan, in an effort to provide coherence to sectoral policies [5]. Some potential factors explaining PA's effects, such as surveillance, remained the same in the SAC period. The Sierra Cabrera-Bedar management plan has no specific budget allocated and is developed according to sectoral or opportunistic funding [23]. Lack of funds probably explains the insufficient implementation of management plans of Natura 2000 sites across Europe [5,13]. Finally, most assessed variables for the SAC period had a maximum of three years of available data since SAC designation, which still seems scarce for full managerial implementation to take place and have an effect.

Unlikely effects of legal designation of Sierra Cabrera-Bedar as an SCI may result from lenient regulations that still allow most human activities on the site [11,37]. Moreover, even if the activity to be developed is highly environmentally impacting, Natura 2000 regulations allows it to go forward if 'imperative reasons of major public interest' are justified [20], further reducing Natura 2000 sites' effects with regard to unprotected sites. Reference [3] showed moderately high effectiveness of Spanish SCIs at reducing land development. However, Natura 2000 regulations are likely to have had little effect in other less conspicuous and impacting human activities which suggests the need for tougher regulation in Natura 2000 sites [38]. Lack of clear effects from legal designation may also be due to poor legal compliance. Actually, Spain's relatively poor law compliance is well reported [39–41] and likely reflects cultural practices by its citizens [42]. The large area covered by Natura 2000 sites in Spain, representing more than 27% of its territory [43], makes regulation infringement detection challenging and facilitates misconduct.

#### 4.2. Perceived Effects: Survey Analysis

Similar to the results of the time series analysis, local organisations perceived little socioeconomic effects of the designation of Sierra Cabrera-Bedar as an SAC, with just one variable perceived to have varied moderately, and a number of them perceived to have varied just slightly in that period. The overall perception of the socioeconomic effects of the SAC designation was negative, as found for other Nature 2000 sites across Europe [5,13,38], which provides ground for enhanced public information, participation and environmental education in the area [13]. There was, however, greater agreement on the positive effects of the SAC designation than on the negative ones.

Local organisations's views did not globally agree with statistical data which suggests partial knowledge on the topic and/or strategic responses by stakeholders, which tend to perceive Natura 2000 sites negatively [13,38]. It also points to the need to complement survey data with time series data to accurately assess socioeconomic issues of PAs in Spain, although representation of local organisations and national representation of the municipalities in our study cannot be assumed. Natura 2000 sites

are relatively recent and little known PAs in Spain and Europe [38] which might explain stakeholder's biased perception on Sierra Cabrera-Bedar. Unawareness of nearby PAs is something relatively frequent elsewhere in Spain [44]. Nevertheless, stakeholders had an accurate perception of the negative effect of the SAC on some variables, such as residential construction, which decreased markedly in that period, although similarly in cases and controls.

#### 4.3. Methodological Remarks

The step-wise designation procedure of SACs provides an infrequently discriminating protection assessment framework. However, it is likely that mild legal protection and recent, moderately expanding management of the assessed Natura 2000 site may not have been sudden, long, and intensive enough to have caused broader, more easily detected effects on local sustainability in developed regions such as the one studied here. Accurately assessing the environmental, social, and economic effects of conservation measures is challenging due to attribution issues, effects on intangibles, and selection of affected stakeholders [9,14]. Other issues regarding data availability, reliability, consistency, resolution, and adequacy of controls can be added [5,15]. Natura 2000 sites tend to be designated in places with little human activity [5], which makes it difficult to find suitable controls in causal studies. This issue was reflected in the different proportion of natural and semi-natural land-uses of our controls, which adds some uncertainty to the results. We also faced the challenge of analysing a large set of impact variables, each of them affected by a number of confounders that need to be analysed for valid causality but that are almost impossible to identify and assess comprehensively [9]. Previous studies have assessed the impact of PAs on one or few socioeconomic variables, with or without covariates [9,34]. Other studies that assessed a larger set of variables faced the same additional attribution issue [15].

## 5. Conclusions

The effects of the legal and managerial designation of Sierra Cabrera-Bedar as an SCI and SAC on involved municipalities were unclear, although some evidence suggests greater sustainability of the SAC. Local stakeholders perceived limited, chiefly negative, socioeconomic effects of SAC designation, although positive effects were more agreed upon than negative ones. Disagreement between official statistics and perceptual data suggests preferring time series analyses to organisational surveys for accurate local PA socioeconomic assessments in Spain, although representation of this study's samples of organisations and municipalities should not be assumed.

**Supplementary Materials:** The following are available online at <http://www.mdpi.com/2071-1050/10/9/3176/s1>.

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