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# Conflicting Values in Rural Planning: A Multifunctionality Approach through Social Multi-criteria Evaluation

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**Abstract:** The planning of rural land depends to a large extent on the agrarian and forestry development model agreed upon for it. Within the framework of agrarian multifunctionality, to evaluate different development alternatives and their effect on territorial planning, its multiple dimensions must be considered as well as the interests and needs of the stakeholders. This work thus addresses the comprehensive evaluation of development alternatives for the rural area of a municipality of the Basque Country (Spain) through the implementation of a multi-criteria evaluation method with social participation. The results show, firstly, the existence of trade-offs between the functions to be promoted in the various development models evaluated. Secondly, the results indicate the need to reverse recent trends in the sector and the convenience of moving towards an agro-livestock model of greater ecological and local character, independently of the followed forest model. In fact, the evaluation carried out also reveals, thirdly, the existence of more or less latent conflicts, in particular with regards to forest policy.

**Keywords:** rural development; multifunctionality; rural planning; participatory process; social multi-criteria evaluation (SMCE).

## 1. Introduction

Traditionally used for agrarian purposes, European rural land has undergone major reshaping in recent decades due to changes in the agrarian and forestry model and the pressures of urbanization and industrialization [1–3]. Rural spaces are no longer valued solely for their status as suppliers of agricultural products, but they also offer different alternatives of use, often in conflict with each other. This transformation of non-urban land uses requires management policies appropriate to the new demands and perspectives placed on the rural world.

In addition to the agrarian function, rural spaces offer fundamental environmental services [4]. Forests, for example, have gone from being mere wood producers to becoming important elements in the landscape, in maintaining biodiversity and in regulating the hydrological cycle [5, 6]. On the other hand, social aspects such as the possibilities for leisure or the cultural value provided by rural spaces are also increasingly relevant in our society [7–9]. This shows, in turn, a change in social perception about the rural environment, recognizing the important role of rural spaces and agricultural activities in the conservation of the environment and its impact on human well-being

[10], as well as the value of agricultural products relating them with quality and well-being [11]. This new social perception also values farmers for their role as producers and promoters of rural areas [12–15].

The concept of agricultural multifunctionality refers to this diversity of goods and services of an ecological, landscape, social and cultural nature provided by agricultural and forestry activities and rural areas as a whole. Multifunctionality emerged at the end of the 1990s within the European Union (EU) as a paradigm that responded to the transformation of European rural spaces [16] and, soon after, it extended to all industrialized countries [17]. Multifunctionality has been contemplated in European rural development policies since the agrarian reform proposed in Agenda 2000 [18], enabling rural development in the EU to gradually evolve from a sectoral approach focused on agriculture towards a more integrated vision, which also includes a vast vector of non-agrarian sectors and stakeholders [11, 18]. Under the so-called second pillar of the Common Agricultural Policy (CAP), rural development policies have adopted an intersectoral approach and a more territory-oriented vision, paying attention to the relevance of ecological, social and cultural services that produce both agrarian and forest ecosystems [18, 19].

This integrated vision of rural territory has been complemented, in turn, by two main territorial approaches and scales. On the one hand, the local scale has gained prominence in the socio-economic dynamization of rural areas, for example, through the LEADER approach. And, on the other hand, the EU has promoted all across Europe a policy of conservation of the environment basically in accordance with the development of the Natura 2000 network. Thus, the planning of rural spaces should be oriented to integrate and make compatible this amalgam of intersectoral objectives dependent on different territorial scales [20].

In practice, however, it is not an easy task to achieve the numerous objectives facing agricultural multifunctionality as a whole. The interactions between the goods and services provided by rural areas are complex due to the trade-offs between them. Thus, the fact that the demand for multifunctionality is diffuse may lead to an insufficient provision of certain goods and services derived from agricultural activity, such as those related to the conservation of the environment [21]. Also, given that rural land is a limited resource, it may be that public policies enhance certain functions to the detriment of others according to the development model chosen for it [22]. For this reason, it is not surprising that the various functions attributed to rural spaces are in conflict, particularly in the field of territorial planning [22, 23]. In fact, the stakeholders of the rural world hold visions, often opposed to each other, which can lead to these disagreements [24].

Indeed, the need to involve the local community in the management of natural resources is widely recognized [25–28], with the participation of the stakeholders involved being one of the pillars of good governance [15, 29]. The involvement of the population and bottom-up participatory processes constitute an indispensable condition for the planning and development of rural territories [30–33]. In the evaluation of rural development models, therefore, the various functions in dispute should be considered in a comprehensive manner and with a holistic vision [34][35], through the use of interdisciplinary methods of evaluating alternatives, which also integrate the information and interests of the different stakeholders. The local scale is likewise considered adequate for the effective development of participatory processes when establishing the basis for rural development policies and the subsequent planning of rural land.

In this context, this work deals with the integral evaluation of rural development alternatives and their impact on land management through the implementation of a multi-criteria evaluation method with social participation. The evaluation has been carried out in the municipality of Mutriku (Basque Country, Spain) in collaboration with the local government and is framed in the work preceding the approval of the Municipal Land-Use Plan (MLUP). In the following section, we will look at the use of the selected methodology and detail the characteristics of the case study. The third section addresses the participatory process developed and the fourth describes the evaluation carried out. The results obtained are later discussed together with the conclusions reached.

## 2. Methodological Framework and Site Description

### 2.1. Rural planning through the SMCE

Multi-criteria evaluation is a methodology with a long tradition in territorial planning (for example, [36]). In a given problem, the different possibilities of action (alternatives) are evaluated by considering certain relevant aspects (criteria). It has been emphasized, however, that in the decision-making processes, the structuring of the problem is at least as important as the technical evaluation of the alternatives considered [37]. In fact, territorial planning is strongly conditioned both by the complex values that underlie its approach and process [38] as well as by the uncertainty associated with it [39].

Under this prism, Social Multi-Criteria Evaluation (SMCE) is a tool to help decision-making processes in complex socio-ecological contexts. The bases and methodological foundations of the SMCE are distinguished by incorporating the *incommensurability of values* [40, 41]. In accordance with the principle of weak comparability, the absence of a common unit of measure between plural values facilitates the incorporation of the values in dispute. Thus, the SMCE is characterized by introducing an integrative and participatory perspective aimed at facilitating the search for solutions in complex situations such as those related to the management of natural resources or territorial planning.

Accordingly, the choice of the SMCE as a methodological framework for rural planning rests on four main arguments:

1. Territorial planning and management is by definition an area that incorporates a transdisciplinary vision of the territory, and in which different dimensions such as economic, social, landscape, ecological and institutional converge. The SMCE avoids reductionism and confronts *technical incommensurability* by assumptions about the purpose of the model, the scale of analysis, and the establishment of dimensions, objectives, and criteria used in the evaluation process. It also allows the consideration of both quantitative and qualitative information in the whole by use of fuzzy set theory.
2. The different views that the stakeholders involved hold about the development models inherent in planning highlight the existence of *social incommensurability*. The SMCE incorporates these legitimate values, though contrasting in many cases, existing in society, through public participation.
3. Given its flexibility, the SMCE allows for the combination and integration of different methodologies and territorial analytical instruments. For example, the SMCE allows for the integration of the use of Geographic Information Systems (GIS), an indispensable tool for the cartographic visualization of planning.

4. It should be noted that the SMCE is a robust and contrasted method, whose usefulness and applicability has been demonstrated in the many real cases in which it has been applied. Among these cases, there are works carried out both in the field of territorial planning [42–45] as well as in the agrarian and forestry sector [46–49], the two areas to which our case study is focused on.

The evaluation process developed in the planning of the rural area of Mutriku has comprised five phases (Figure 1): (1) institutional analysis, in which the problem is defined and the stakeholders involved are identified; (2) selection of the evaluation criteria, to determine through which indicators the evaluation will be carried out; (3) definition of the alternatives, in which the alternatives to be evaluated are defined; (4) complete the Multi-Criteria Impact Matrix (MCIM) and choose the aggregation method, to evaluate the alternatives and obtain their ranking; (5) sensitivity analysis and conflict analysis, to check if the results are robust both technically and socially. All these phases have had the participation of the stakeholders and have been developed in an iterative manner, thus allowing their feedback in terms of information and decision making throughout the process.

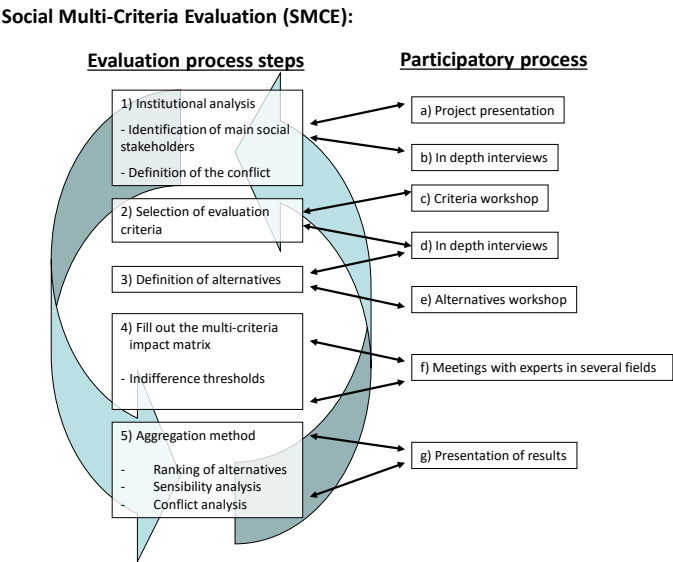


Figure 1. Evaluation process phases.

2.2. Study site

Mutriku is a coastal municipality located west of Gipuzkoa (Basque Country), in the Debarrena Valley (Figure 2), an area of approximately 2,700 ha with a population of 5,325 (census 2016). Due to its particular location, with a very mountainous relief and narrow valleys, and not being on the main axis of communications, there was no significant industrial development in this municipality unlike other municipalities in the area. From the ecological point of view, Mutriku also stands out for the massifs of Izarraitz, Andutz, and Arno, this last one being a Special Area of Conservation (SAC) belonging to the Natura 2000 network due to the outstanding ecological value of the Atlantic holm oak.

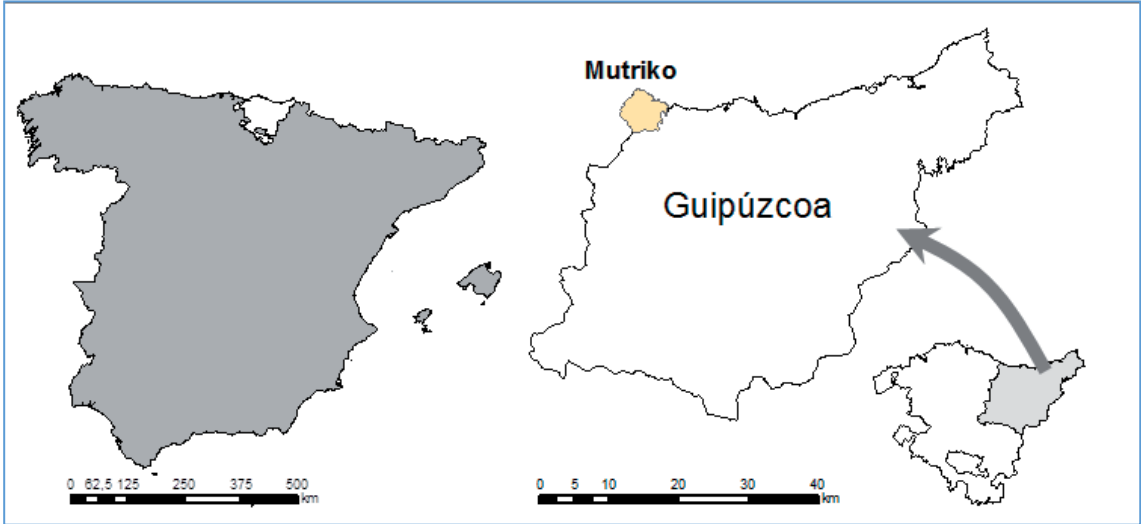


Figure 2. Map of Mutriku within Spain.

Until the mid-twentieth century the rural areas of Mutriku maintained an important agricultural activity. However, like the entire Cantabrian coast, the industrialization of the area has favored the abandonment of agricultural activity in recent decades. Thus, farmland has been reduced significantly since then in favor of forests, especially those of allochthonous species, taking up nowadays more than three quarters of the rural land of the municipality (Table 1).

**Table 1.** Cultivated land and woodland in Mutriku (in ha), 1954–2012.

	1954	2012
Farmland (vegetables)	492.01	55.91
Meadows	375.82	468.60
Pasture and scrubland	643.00	191.75
Forestry plantations	484.90	1,176.60
Mixed Atlantic woodland	185.63	290.26
Holm oak woodland	438.07	459.64
Urban land and Other	101.04	77.71
Total	2,720.47	2,720.47

Source: Author’s own compilation from Subsidiary Rules of 2006 and own measurements.

Most of the current farms are owned by farmers who work in a mixed way in agriculture and in industry or other work activities. In the last Agrarian Census (2009), there was a decrease in the number of farms as well as in the annual work units (Table 2), predominantly small farms aimed at self-consumption and small-scale sales (beef and sheep farms basically). The constant decrease in the application for compensatory grants for mountain farming (23 applications in 2007 and 15 in 2013) indicate that this trend has continued in recent years. In the same way, the rate of aging of farmers is striking, leaving only one farmer less than 40 years old (Table 2). This decline in agricultural activity has also meant an important change in the landscape, where the traditional hamlet (linked to farming activities) is about to disappear and with it a whole culture and way of life.

**Table 2.** Number of agricultural holdings, AWUs, and age of holders of holdings in Mutriku, 1989–2009.

	1989	1999	2009
Number of agricultural holdings	121	116	95
Agrarian Annual Work Units (AWU)	137.3	134.5	106.5
Holdings with owners under 40 years	25	6	1
Holdings with owners between 40–64 years	78	81	63
Holdings with owners over 65 years	18	29	31

Source: Eustat, Agrarian Census of 2009.

The SMCE carried out has been framed in the process of the elaboration of the MLUP of the municipality. The main objective was the evaluation of different alternatives of rural land uses, thus offering a useful and applicable tool to the municipal government when making decisions about it. During the institutional analysis, by means of the bibliographic documentary review and the first interviews with stakeholders, four outstanding elements were identified that helped to delimit the problem around the rural planning of Mutriku:

- a. Abandonment of agricultural activity. In recent decades the agricultural and livestock activity has been reduced significantly, with a high rate of aging among farmers. Much of the land previously destined to pastures and vegetables are today forests of non-native species. These factors cause a significant impact on the landscape.
- b. Agricultural model dependent on aid. Agro-livestock activity is no longer the main source of income on most farms. Agriculture and livestock are complementary income and their existence depends largely on public aid.
- c. With the abandonment of agrarian activity coniferous forests (non-native species), of greater economic profitability than other species, have increased significantly in recent decades. The fact that the ownership of the land is practically completely private has favored this transformation, which in any event has an important impact on the biodiversity and landscape of the area.
- d. Shortage and difficulty of access to land. The orography of the Cantabrian coast, with large slopes and narrow valleys, does not offer sizeable areas for agriculture. In addition, there is a high urban pressure on these lands. On the other hand, a culture in which the land has passed from parents to children, staying for generations in the family, hinders access to land for new entrepreneurs. The model of public aid, which benefits the ownership of farms, is another factor that hinders access to land.

3. Participatory Process

The conditions that are established for the participatory process will determine its quality and legitimacy [26]. There are basic issues to consider in the approach to participatory processes such as the degree or intensity of participation [50], the selection of the participating stakeholders and the mode or method of participation used [51]. It is important to include all the relevant stakeholders from the point of view of the quality of the information and the efficiency of the agreements, considering that all opinions and interests have the right to participate [52, 53]. Thus, it is necessary



that the participatory processes have a wide range of participants from different areas [54, 55], also combining local and scientific knowledge [56–58], which will ultimately result in the legitimacy, acceptance and transparency of the process itself [59–61], and in the social learning derived from it [26, 62, 63].

### 3.1. Identification of the stakeholders

The identification of stakeholders is therefore a crucial aspect in the initial development of the participatory process. This task is aimed at knowing who the stakeholders related to the area of study are and what their positions and interests are, as well as the resources and tools available to defend those interests. This task begins with institutional analysis and as the process goes on, new involved stakeholders become known. According to the classification followed by other authors [30], the stakeholders involved or related to the rural area analyzed have been divided into four main groups:

- a. *Institutional stakeholders.* The Gipuzkoa Provincial Council (GPC) and the City Council of Mutriku. Their general objective is the sustainable development of the rural environment, keeping the countryside alive and creating jobs while conserving nature. In order to reach these objectives, however, they use different models of development. This difference has been notable in forestry policies, causing several clashes in the past within the GPC. There are therefore more traditional positions and positions with greater ecological concern among the institutional stakeholders. They have regulatory and financial resources.
- b. *Technical stakeholders.* Organizations dedicated to rural development (Debemen, HAZI, OCA, Geoparke) and agricultural unions (EHNE, ENBA). With the general objective of defining and implementing rural development policies, these agencies are dedicated to developing and implementing regional rural development programs, advise rural entrepreneurs, manage public aid and defend the rights of farmers and rural inhabitants, among other tasks. They have financial and human resources, and a broad knowledge of the rural environment and its inhabitants.
- c. *Economic stakeholders.* Owners of the land and populating the rural area. Most of these stakeholders, traditional farmers, stand up for forestry policies in favor of the exploitation of coniferous forests because of the profitability they have generated in recent decades. Another sector of stakeholders in this group, however, formed by innovative farmers, advocates new agrarian models aimed at new markets, such as ecological exploitation or farming dedicated to producing quality agricultural products. This second group demands new markets, with shorter and more direct distribution channels.
- d. *Social groups stakeholders.* The groups of citizens that consider the rural space as a natural asset to be conserved and a place for leisure and enjoyment of free time. They prioritize ecological aspects in rural development planning. They show favorable opinions towards the protection of native species in forest policies.

### 3.2. Process: defining criteria and building alternatives

The exchange of information with the identified stakeholders has occurred throughout the process and through different participatory techniques (Table 3). Their contributions have been a fundamental input in the SMCE process, both in the choice of criteria and in the elaboration of alternatives.

**Table 3.** Milestones in the participation process.

<b>Phase of the evaluation process</b>	<b>Milestones in the participation process</b>	<b>Brief description</b>	<b>Date</b>
Phase 1. Institutional analysis.	Presentation of the project to the City Council of Mutriku	Presentation of the project as a valid tool for the preparation of the MLUP. Description of the work methodology and general objectives.	16 January 2014
Throughout the process (the majority between phases 1 and 3).	In-depth interviews with stakeholders and experts	Summary of opinions and positions of the stakeholders, aspects that they consider important in the planning of rural land and positioning before different development alternatives.	February 2014–May 2015
Phase 2. Selection of evaluation criteria	First group dynamics: criteria workshop	Workshop to select the evaluation criteria. Criteria that are significant for rural planning are selected in a working group consisting of analysts and stakeholders.	30 June 2014.
Phase 3. Definition of alternatives	Second group dynamics: workshop of alternatives	Contrast the criteria selected in the previous workshop, and define the different planning alternatives through rural development models.	15 January 2015
Presentation of the results	Third group dynamics: Presentation of results	Present the results obtained in the technical analysis to the stakeholders, and compare these results with their opinions.	19 July 2016

Source: Author's own compilation.

Decisions on planning and natural resources entail a high degree of uncertainty, and the different interests and scales that converge in these decisions require in-depth and elaborate information. Thus, qualitative participatory methods are appropriate because they permit in-depth knowledge of both the problems and the positions of the stakeholders, and offer sufficient time for both stakeholders and analysts to deliberate and participate in the social learning process [50, 64, 65] as well as to reach consensus [26, 53]. The participatory techniques used in this evaluation process have basically been in-depth interviews and group dynamics or focus groups, in accordance with the objectives sought and in line with the experiences of other works [44].

Throughout the evaluation process 32 interviews have been conducted in total, with some stakeholders interviewed on more than one occasion. According to the procedure followed, all the interviews have been developed with a script previously prepared (semi-structured), and in a place and at a time agreed with the interviewee. In addition, the project was presented to the heads of the municipality in a public presentation in which the methodology and procedure to be followed during the evaluation process were explained.



In order to define and decide the evaluation criteria and possible planning alternatives for rural land, two focus groups were carried out, according to the pertinence of the technique for this [66] and a third was used to present the results. In the first one, the criteria that are considered important for the future of rural land were chosen, that is the criteria according to which the development alternatives will be evaluated later. In agreement with previous works, the chronological order of the workshops employed was to avoid strategic behaviors by the stakeholders in favor of their interests [62, 67]. Once the criteria were chosen and defined, in a second focus group the possible alternatives or models of rural planning were raised. After the debate with the stakeholders, this workshop showed the need to rethink the alternatives initially proposed by the group of evaluators, defining new development alternatives more suited to the particularities and specific situation of the area. It is necessary to point out therefore the determining factor that was the participation of the stakeholders through this second workshop, it being a decisive meeting for the construction of the alternatives. In the third group dynamics, the technical results obtained in the evaluation process were presented and discussed. These results had different levels of acceptance by the stakeholders, revealing the underlying conflict of the different models of rural development evaluated.

3.1.1. Definition of criteria

The evaluation criteria are the technical expression of the interests, expectations, and desires of the stakeholders, and must represent the multiple dimensions of the problem [40, 41]. The criteria are the tool through which alternatives are compared from different points of view. To evaluate the different alternatives, therefore, it is necessary to select a series of criteria that represent the relevant aspects and the interests of the stakeholders. Table 4 shows the selected criteria, the interests they reflect, and the method of evaluating them.

Table 4. Definition of evaluation criteria.

Dime nsion	Criteria	Needs and expectations	Indicator/Evaluation scale
Ecological	1. Biodiversity	<ul style="list-style-type: none"><li>- Conserve the diversity of the flora and fauna of the rural area.</li><li>- Develop forestry management that allows the conservation of biodiversity.</li><li>- Promote agricultural practices that are respectful of biodiversity.</li><li>- Protect local species (seeds, autochthonous species, etc.).</li></ul>	Zoogeographic assessment.  Unit: index Direction: maximize
	2. Landscape	<ul style="list-style-type: none"><li>- The landscape as an indicator of conservation of the natural environment.</li><li>- Value the landscape formed by traditional agriculture.</li><li>- Analyze the impact of forestry models on the landscape.</li><li>- Landscape as a value for leisure, sport, and recreation.</li></ul>	Phytogeographic assessment.  Unit: index Direction: maximize

Economic	<b>3. Income from agricultural activities</b>	<ul style="list-style-type: none"> <li>- Creation of employment in the first sector. Attraction of young people.</li> <li>- Avoid excessive dependence on CAP aid.</li> <li>- Stop the abandonment of agricultural holdings and facilitate the acquisition of land for new entrepreneurs.</li> <li>- Develop profitable agricultural and forestry models and research new markets for agricultural products.</li> </ul>	Net margin obtained in agricultural and forestry holdings.  Unit: euros Direction: maximize
	<b>4. Public cost</b>	<ul style="list-style-type: none"> <li>- Aid to the agricultural sector is an important part of their income but a social cost at the same time.</li> <li>- Public aid must promote sustainable agrarian models, instead of perpetuating the current model in crisis.</li> <li>- The cost of infrastructure in rural areas is burdensome for administrations, especially for local administrations.</li> </ul>	Subsidies received by farms and forestry.  Unit: euros Direction: minimize
Social	<b>5. Consumption of local products</b>	<ul style="list-style-type: none"> <li>- Commitment, sensitization, and awareness of producers and consumers.</li> <li>- Need to increase local demand for products. Decrease external dependence. Promote short distribution channels.</li> <li>- Importance of agricultural activities being profitable to ensure their viability.</li> <li>- The administration should promote research into new modes of production and marketing of agricultural products, as well as actions of social awareness.</li> </ul>	Proportion of local products consumed by the population.  Unit: qualitative assessment Direction: maximize
	<b>6. Attachment to the rural land</b>	<ul style="list-style-type: none"> <li>- Maintain and transmit rural culture and knowledge.</li> <li>- Value the contribution of the work of farmers and ranchers for the maintenance of the landscape and the rural world.</li> <li>- Guarantee the quality of life in rural areas: services and infrastructure.</li> </ul>	Maintenance and conservation of a live rural environment.  Unit: qualitative assessment Direction: maximize

Source: Author's own compilation

It should be noted that in this process the participation of stakeholders has been decisive since the criteria have been defined in the first instance based on: (a) the information from the in-depth interviews and (b) the content of the first focus group, whose results were contrasted in the second. Subsequent technical work has established the most appropriate evaluation mode and has included the six criteria selected according to the paradigm of agricultural multifunctionality: landscape and biodiversity reflect the ecological dimension; agricultural incomes and the public cost of the measures reflect the economic dimension; and the consumption of local products and attachment to the land represent the social dimension.

### 3.1.2. Construction of the alternatives

The institutional analysis and the participatory process, as a whole, have shown the different visions and positions held by the stakeholders on the rural development model and the consequent

**Table 5.** Description of each alternative.

**Alternative 1: Maintain the current dynamics (*Business as usual*–BAU)**

This alternative reflects the future scenario in the case of maintaining the general dynamics of the last three or four decades. A gradual reduction of the agricultural activity and the maintenance or proliferation of coniferous forests is foreseen. No changes are anticipated in land use, legislation, or municipal planning.

**1. Alternative**

Figure 3. Map of current land uses in Mutriku.

**Alternative 2a: Medium promotion of new agrarian models**

This alternative proposes the recovery of all the lands used in the 1950s that are currently in disuse for the primary sector, amounting to some 51.9 ha that are currently classified as scrub. In particular, it is proposed to start in these areas two farms for organic products, two greenhouses, a new holding of fruit trees, a sheep farm and another farm for beef. In relation to the wooded area, current policies and uses would be maintained.

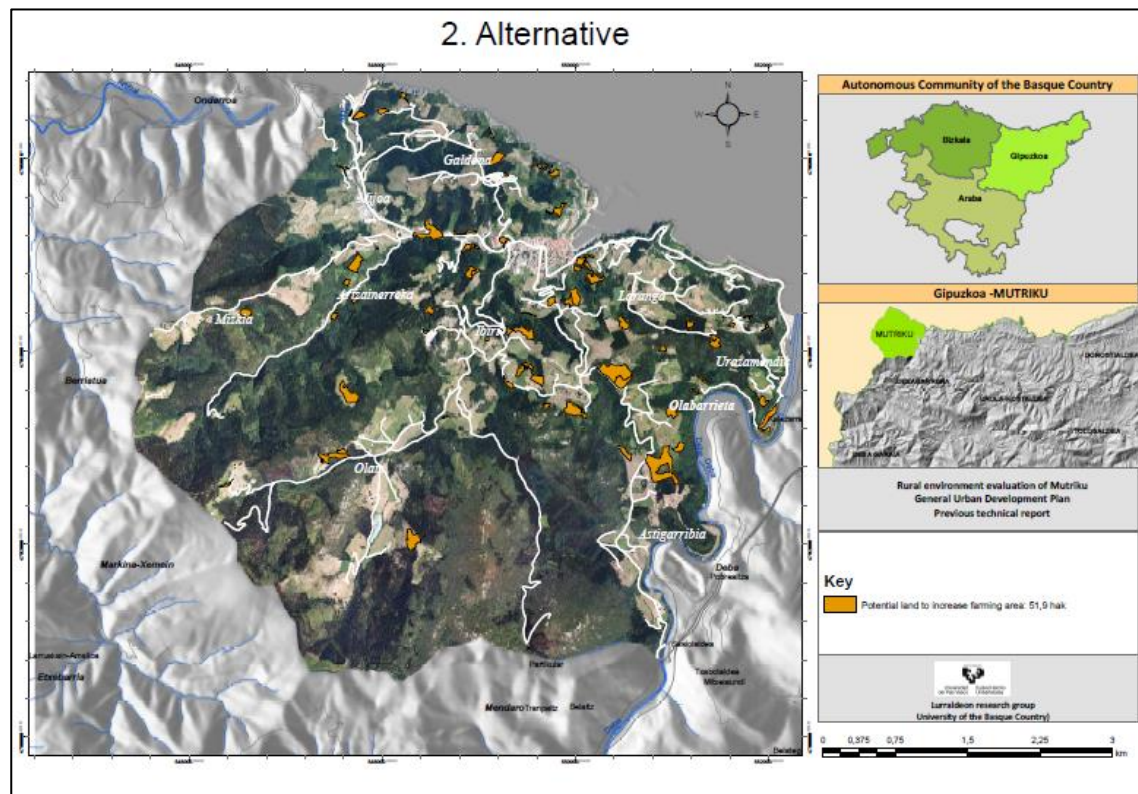


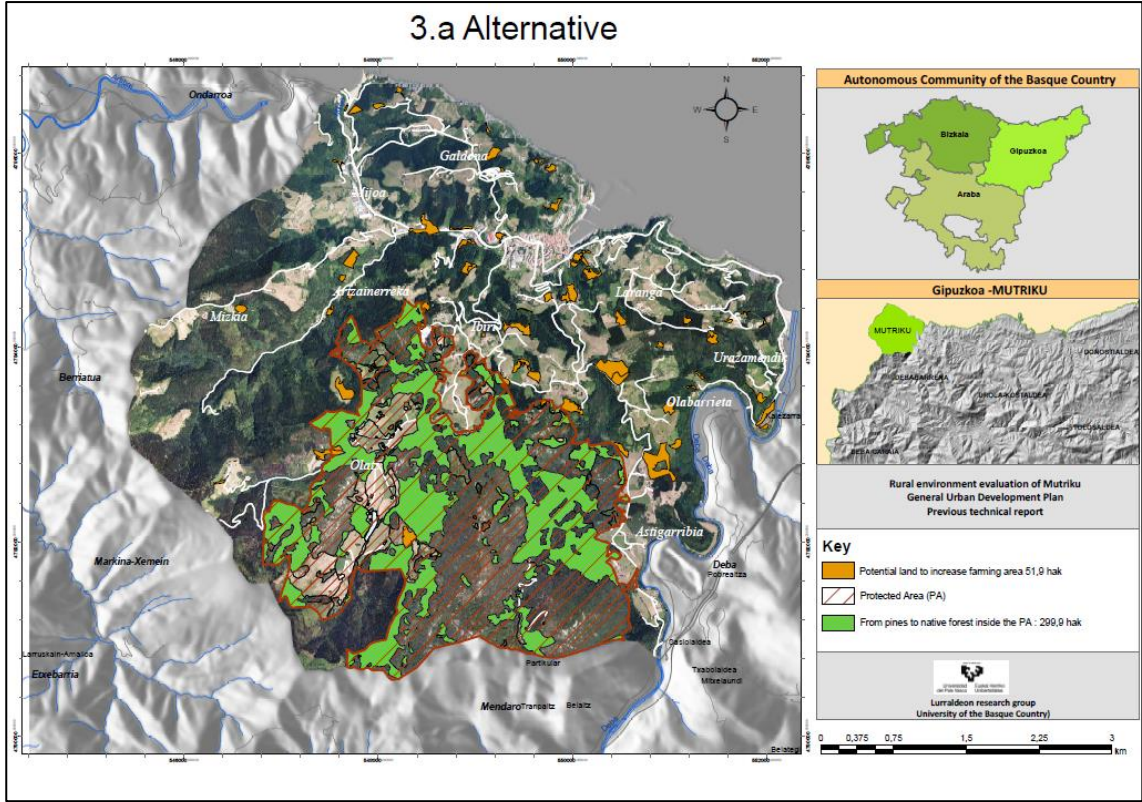
Figure 4. Map of land uses of Alternative 2a.

This is an additional part to Alternative 2a, but to reflect a greater empowerment of new agricultural models, a larger livestock farm is proposed than in 2a on lands that are currently occupied by forestry plantations (note: the new livestock farm would occupy private lands, so as not to create conflict among the potential owners, it has not been reflected on the map).

## Alternative 3a: New agrarian models and medium promotion of the autochthonous forest

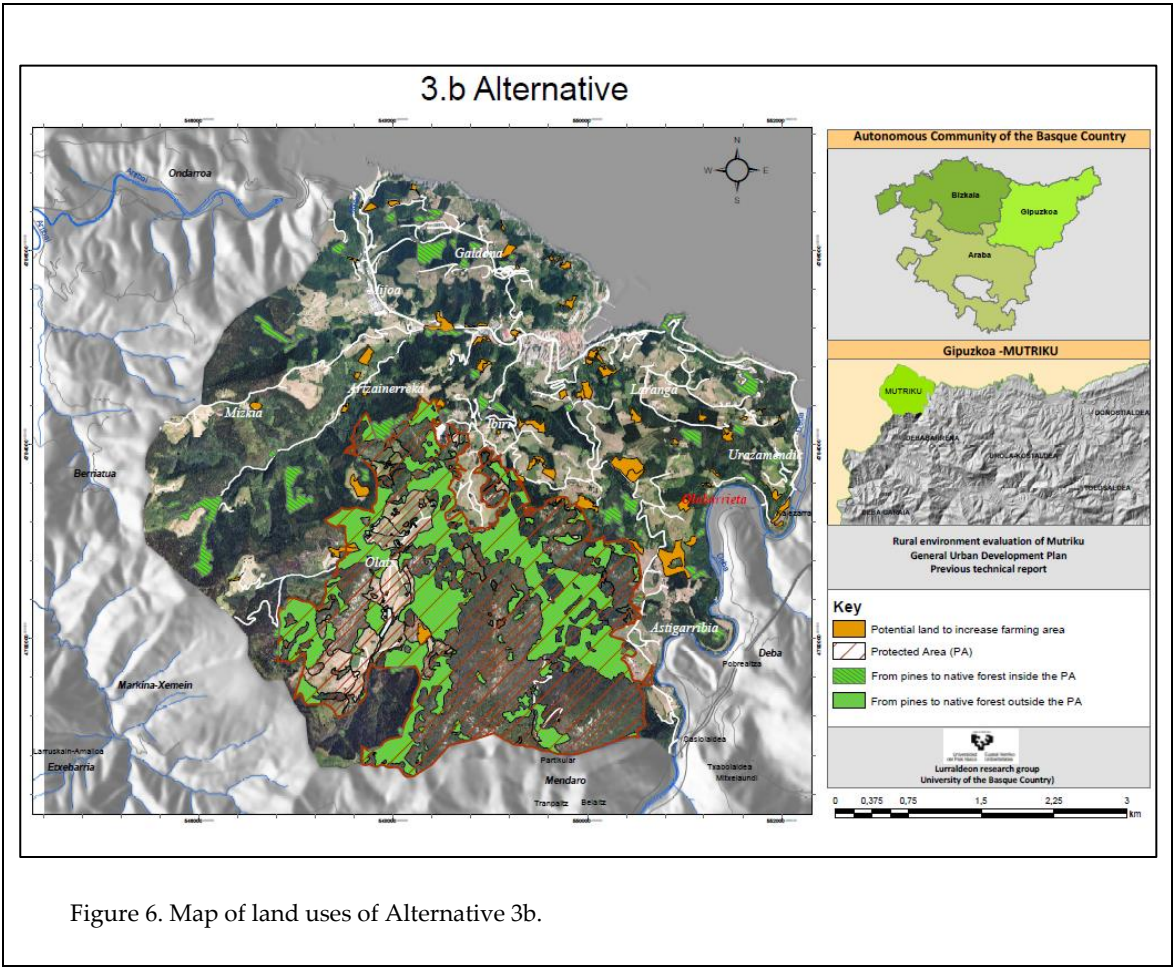


In addition to the promotion of new agrarian models detailed in Alternative 2a, a change of forest policy is advocated in favor of a larger area of native species to the detriment of non-native plantations (radiata pine, eucalyptus). The conversion of the current 299.9 ha of pine in the Arno SAC to autochthonous species is proposed.



**Alternative 3b: New agrarian models and intense promotion of the autochthonous forest**

This alternative is also based on the promotion of new models of agriculture and livestock in Alternative 2a. For the forestry sector, however, the conversion of allochthonous species to autochthonous species in 377.7 ha within and outside the SAC is proposed.



Source: Author’s own compilation.

**Table 6.** Differentiating elements of each alternative with respect to the current situation.

	Alt. 1	Alt. 2a	Alt. 2b	Alt. 3a	Alt. 3b
Agricultural/cattle	Continues the current dynamics	+ 2 ecological holdings (4 ha) + 2 greenhouses (1 ha) + 1 fruit orchard (3 ha) + 1 sheep farm (22.5 ha) + 1 beef farm (20 ha) - Reduction in scrubland (50.5 ha)	Alt. 2a  + 1 sheep farm (22.5 ha)	Alt. 2a	Alt. 2a
Forestry sector	Continues the current dynamics	Current forestry use	- Reduction in pine forest (22.5 ha)	+ Native forest in SAC Arno (299.9 ha) - Pine forest in SAC Arno (299.9 ha)	+ Native forest throughout the municipality (377.7 ha) - Pine forest throughout the municipality (377.7 ha)

Source: Author’s own compilation.



4. Evaluation: integrating multifunctionality and incorporating opposite visions

4.1. Valuation of criteria

As has been pointed out, the SMCE allows us to overcome technical incommensurability by incorporating valuations of different dimensions without the need for all of them to be reduced to a single measure. Thus, the six selected criteria have been assessed through different methodologies and using different units of measurement. In some cases, the qualitative assessment is more appropriate, given that by its very nature some criteria may be difficult to quantitatively assess, or there may even be no reliable data or sources for a correct quantification of the impacts. Thus, the evaluation of the criteria has involved an important technical work in which experts from different scientific fields have collaborated.

The steps taken in this assessment process are the following: (1) choice of indicators that best represent the evaluation criteria to assess the impacts of each alternative; (2) collection of information and data sources necessary for the evaluation; (3) choice of spatial and temporal scales in which indicators are valued; (4) evaluation of the alternatives, which have finally been integrated into the MCIM. The assessment of each criterion is briefly described below.

4.1.1. Biodiversity

To assess the biodiversity criterion, a specific index based on an ad hoc zoogeographic assessment has been developed for the area under study [68], based on previous work on this methodology [69]. To make up this index, qualitative and quantitative inventories have been carried out on the fauna of each of the seven local habitats identified in Mutriku.

Different methods and specific tools have been applied for measurement and evaluation such as local eye measurements, listening stations, interviews with local agents, and consultation of documentation related to the environment. First, the area to be studied has been zoned into environmental units or habitats that correspond to each land use. As can be seen in Table 7, the rural land of Mutriku consists of seven different land uses. For the quantitative analysis, the number of taxa of each species is quantified, and as for the qualitative analysis, the protected species and their degree of risk as well as plague species and their effect are valued. For the zoogeographic valuation (FV) the following variables and their relation are considered according to the following formula: number of species (N), protected species (PE), vulnerable species (VU), rare species (RA), species of special interest (SI) and introduced species (INT).

$$FV = N + \{5 \cdot (PE) + 4 \cdot (VU) + 3 \cdot (RA) + 2 \cdot (SI)\} - INT$$

Thus, the environmental units identified in the rural land of Mutriku obtain a certain zoogeographic valuation. The score corresponding to each of the alternatives is calculated based on the different land uses raised in them. Starting from works that relate biodiversity and the extension of the different land uses [70] it is deduced that although this relation is not directly proportional, in smaller dimensions the smallest variations have a direct effect. Therefore, to calculate the biodiversity valuation for each proposed alternative, the ha of each environmental unit has been multiplied by the zoogeographic valuation of said unit (Table 7).

Table 7. Valuation of biodiversity for each alternative.

		<b>Zoogeographic valuation</b>				
<b>Land use</b>	<b>FV</b>	<b>Alt. 1</b>	<b>Alt. 2a</b>	<b>Alt. 2b</b>	<b>Alt. 3a</b>	<b>Alt.3b</b>
Mixed Atlantic woods	127	35,907	35,907	35,907	73,994	83,875
Holm oak woodland	128	58,834	58,834	58,834	58,834	58,834
Riverside vegetation	113	851	851	851	851	851
Coniferous woodland	56	65,890	65,890	64,770	49,095	44,738
Pasture and scrubland	119	17,833	13,006	13,006	13,006	13,006
Farmland	93	62,417	68,593	70,973	68,593	68,593
Urban land	47	3,652	3,652	3,652	3,652	3,652
		<b>245,383</b>	<b>246,732</b>	<b>247,992</b>	<b>268,025</b>	<b>273,549</b>

Source: Author's own compilation.

#### 4.1.2. Landscape

The valuation of the landscape is done through an index calculated ad hoc for this investigation. For this purpose, a methodology called LANBIOEVA (Landscape Biogeographic Evaluation) has been used which offers a resulting index called PRICON [71]. This index includes a phytogeographic valuation that includes the natural, cultural, and conservation interest of each environmental unit or land use identified. The PRICON index is based on two sub-indices, the general natural interest index (INNAT), based on the valuation of environmental aspects, and the cultural interest index (INCUL) based on ethnobotanical, didactic, and perception values.

The INNAT sub-index, in turn, is calculated considering the general phytogenic interest (INFIT), the general territorial interest (INTER), and the general mesological interest (INMES). The INNAT sub-index takes values between 8 and 160, according to the following formula:

$$\text{INNAT} = \text{INFIT (from 1 to 50)} + \text{INTER (from 1 to 50)} + \text{INMES (from 6 to 60)}$$

The INCUL sub-index, on the other hand, collects cultural values, whose consideration is increasingly important for environmental awareness and conservation policies. Ethnobotanical values (ETNO), perception values (PER), and didactic values (DID) are considered for the calculation of this sub-index. This sub-index acquires values between 4 points and 40 points, and is calculated through the following formula:

$$\text{INCUL} = \text{ETNO (from 2 to 20)} + \text{PER (from 1 to 10)} + \text{DID (from 1 to 10)}$$

Considering these sub-indices and the conservation interest level of the land under study, the PRICON index score is calculated for each environmental unit. For this valuation, 54 inventories were made that allowed calculating said sub-indices for each of the environmental units studied and also calculating the PRICON index for each one of them [72]. From this index, the landscape valuation has been made by calculating its value according to the surfaces of the environmental units in the different alternatives evaluated (Table 8).

**Table 8.** Valuation of landscape for each alternative.

		<b>Landscape valuation</b>				
<b>Land use</b>	<b>PRICON</b>	<b>Alt. 1</b>	<b>Alt. 2a</b>	<b>Alt. 2b</b>	<b>Alt. 3a</b>	<b>Alt. 3b</b>
Mixed Atlantic woods	<b>2,152.50</b>	608,576	608,576	608,576	1,254,111	1,421,575

Holm oak woodland	<b>1,935.90</b>	889,817	889,817	889,817	889,817	889,817
Riverside vegetation	<b>2,008.90</b>	15,127	15,127	15,127	15,127	15,127
Coniferous woodland	<b>877.50</b>	1,032,466	1,032,466	1,014,916	769,304	701,034
Pasture and scrubland	<b>1,059.10</b>	203,082	148,115	148,115	148,115	148,115
Farmland	<b>1,155.00</b>	605,809	665,753	688,853	665,753	665,753
Urban land	<b>416.00</b>	32,327	32,327	32,327	32,327	32,327
		<b>3,387,206</b>	<b>3,392,183</b>	<b>3,397,733</b>	<b>3,774,555</b>	<b>3,873,750</b>

Source: Author's own compilation.

#### 4.1.3. Agrarian income

This criterion includes income generated by agricultural, livestock, and forestry activities associated with each alternative, without including subsidies. This criterion is valued quantitatively, in euros. The main source of information for this assessment has been the data offered by the GPC on the annual income of farms in the rural area studied. The net margin is the indicator used to reflect the income obtained by agricultural holdings<sup>1</sup>.

The GPC provided data referring to the agricultural incomes obtained in the Mutriku farms in the year 2014 (the most recent year available). This data has been used to value Alternative 1, which amounts to 367,028 euros/year. The calculation of the other alternatives has been made based on the new agricultural and livestock farms proposed and the new forest uses contemplated in each one of them (Table 9).

**Table 9.** Variation and total agrarian income obtained in each alternative, net margin (euros).

	<b>Alt. 1</b>	<b>Alt. 2a</b>	<b>Alt. 2b</b>	<b>Alt. 3a</b>	<b>Alt. 3b</b>
Net margin for new agricultural holdings	-	+88,871	+88,871	+88,871	+88,871
Net margin for new cattle farms	-	+3,395	+6,455	+3,395	+3,395
Net margin for change of pine forest to cattle use	-		-1,234		
Net margin for increase in native woodland	-			+11,035	+14,410
Net margin for reduction in pine forest	-			-29,814	-38,061
<b>Variation in income</b>	-	<b>+92,267</b>	<b>+94,092</b>	<b>+73,487</b>	<b>+68,615</b>
<b>Total income</b>	<b>367,028</b>	<b>459,295</b>	<b>461,120</b>	<b>440,515</b>	<b>435,643</b>

Source: Author's own compilation.

#### 4.1.4. Public cost.

This criterion has been valued quantitatively, in euros, and the direction is to minimize its value. The agricultural, livestock, and forestry subsidies granted by different public administrations have been calculated for the agrarian farms in the region, since this aid supposes a cost for society in general. The main source of information has been the database provided by the Basque Government

<sup>1</sup> The values have been calculated based on Order 3,397 of the Basque Government, which collects information on gross margins, annual work units, expense ratios, and net margins of agricultural holdings.

in which the aid is collected, both from the EU and the state and those from the Basque Government and the GPC.

As in the previous case, the current subsidies of the agricultural, livestock, and forestry holdings of the municipality of Mutriku have been evaluated, but to avoid exogenous biases, the average of the years 2012, 2013, and 2014 has been taken (most recent data). For the calculation of aid, two sources have been used. On the one hand, firstly, Provincial Decree 66/2008, in which aid from the EU is developed and regulated through the Rural Development Program of Euskadi and, secondly, aid co-financed by the Basque Government and regulated through the EREIN program for the creation of new jobs. On the other hand, aid to forestry operations has been calculated on the basis of Foral Decree 77/2008 for the conservation, improvement, and maintenance of Gipuzkoa's forests. The aid that the forestry sector would receive in Alternatives 3a and 3b are calculated on the basis of loss of earnings for promoting forests of native species. This aid is contemplated for protected areas in the Natura 2000 network, being the case of the forestry change proposed in Alternative 3a. However, in Alternative 3b the concession of the same amounts in non-protected areas is considered, given that they are the most realistic for the proposal of forest management based on native species. Table 10 summarizes the aid from subsidies in the different alternatives.

**Table 10.** Amount of the total subsidies of the different alternatives (in euros).

	Alt. 1	Alt. 2a	Alt. 2b	Alt. 3a	Alt. 3b
Public cost	379,429	416,259	426,565	561,801	599,444

Source: Author’s own compilation.

4.1.5. Consumption of local products

This criterion reflects the daily consumption of local products by the inhabitants of Mutriku. To assess local consumption, various sources of information have been used since there is no reliable data on such consumption, nor is it easy to make quantitative forecasts about it. The qualitative assessment is a good option when there is no reliable quantitative data and the uncertainty is high [67]. For these reasons, the consumption of local products is assessed through a qualitative scale based on the information collected in the institutional analysis and interviews with local agents, and complemented with qualitative information obtained from technicians and academics with knowledge of the subject, following the guidelines of previous research projects [42, 67, 73–75].

In fact, the difficulties of calculation are not only due to the scarcity of information about the offer of local products at the moment, but also because there is not enough knowledge of the potential demand of these products that could exist in the future, taking into account that in some of the proposed alternatives a substantial increase in the supply of these products and a greater awareness and sensitization in favor of their consumption is foreseen.

However, after analyzing the set of information collected, we have been able to draw some relevant conclusions. From the point of view of the offer, the agricultural activity in Mutriku is very scarce, and all the products that are offered locally are sold without difficulties in the region (both that which comes from traditional agriculture as well as that from greenhouse and ecological agriculture). It could be said, therefore, that in the case of agricultural products, currently the demand is greater than the supply. With regards to livestock and the forestry sector, though, their products are sold to intermediaries who redistribute them in more distant markets.

On the other hand, it is necessary to point out that although there is an expected increase in the demand for local products, this will depend largely on the impulse of public purchase (schools, nursing homes), the strengthening of local markets, and the increase in the level of awareness of the population.

Taking into account all of the above, the assessment of the current situation (Alternative 1) is quite unfavorable, while the measures proposed and the new exploitation foreseen in Alternatives 2a and 2b suppose greater local consumption, provided that the condition that everything produced meets its corresponding local demand is fulfilled. In Alternatives 3a and 3b, finally, it has been assumed that forest plantations continue offering their products to external markets, as is currently the case, so no changes are expected in this sector and its valuation is limited to the influence of the new agro-livestock farms (Table 11).

**Table 11.** Valuation of consumption of local products.

	<b>Alt. 1</b>	<b>Alt. 2a</b>	<b>Alt. 2b</b>	<b>Alt. 3a</b>	<b>Alt. 3b</b>
Consumption of local products	Quite bad	Quite good	Good	Quite good	Quite good

Source: Author's own compilation.

#### 4.1.6. Attachment to the rural land

This criterion considers various cultural aspects such as the maintenance of a living rural world, the importance of the farmer in maintaining the landscape, and local knowledge. As in the previous criterion, there is no reliable quantitative information to adequately assess the attachment of each of the alternatives proposed. Therefore, we have chosen to assess this criterion qualitatively based on the information obtained through institutional analysis, interviews with local stakeholders, the two group dynamics, and several consultations with experts.

At the time of assessing the current situation it has been taken into account that nowadays the activity of the primary sector is low and is in sharp decline, threatening a generational change. However, local knowledge is still transmitted and society values the contribution of farmers to the maintenance of rural culture and the natural environment. Therefore, it has been considered that the level of attachment currently in Alternative 1 is medium. Alternatives 2a and 2b would increase this level of attachment by attracting young people to the rural area and reactivating the activity of the sector. On the other hand, the decrease in the exploitation of conifers in Alternatives 3a and 3b would mean a reduction in agricultural incomes, a greater abandonment of farms and an obstacle to the generational change, reducing the traditional way of life and the culture of the hamlet, that is, decreasing the level of attachment. In this respect see Table 12.

**Table 12.** Level of attachment to the land of the different alternatives.

	<b>Alt. 1</b>	<b>Alt. 2a</b>	<b>Alt. 2b</b>	<b>Alt. 3a</b>	<b>Alt. 3b</b>
Attachment to the land	Average	Good	Good	Bad	Bad

Source: Author's own compilation.

#### 4.2. Multi-Criteria Impact Matrix

The MCIM shows all the relevant information about the valuations made in a synthetic way (Table 13). This structuring of the information allows for concise comparisons between alternatives according to each criterion, while facilitating the visualization of the various impacts collected in each alternative by virtue of the type of information used.

**Table 13.** Multi-Criteria Impact Matrix.

DIMENSIONS	CRITERIA	Unit of measurement	Direction	ALTERNATIVES				
				BAU	New agrarian models		Promotion of native woodland	
				Alt. 1	Alt. 2a	Alt. 2b	Alt. 3a	Alt. 3b
				Continuati on of current dynamics	Medium promotion	Intense promotion	Alt. 2a and medium promotion of native woodland	Alt. 2a and intense promotion of native woodland
Ecological	Biodiversity	Index	Max	245,383	246,732	247,992	268,025	273,549
	Landscape	Index	Max	3,387,206	3,392,183	3,397,733	3,774,555	3,873,750
Economic	Agrarian income	€	Max	367,028€	459,295€	461,120€	440,515€	435,643€
	Public cost	€	Min	379,429€	416,259€	426,565€	561,801€	599,444€
Social	Local consumption	Qual.	Max	Quite bad	Quite good	Good	Quite good	Quite good
	Attachment to the land	Qual.	Max	Average	Good	Good	Bad	Bad

Source: Author's own compilation.

Note (1): Preference thresholds in quantitative criteria: (a) *Biodiversity*, indifference ( $\mu=1,000$ ), weak indifference ( $\mu\approx 4,000$ ), preference/rejection ( $\mu>$ ;  $\mu< 5,000$ ) and strong preference/strong rejection ( $\mu>$ ;  $\mu< 8,000$ ); (b) *Landscape*, indifference ( $\mu=400$ ), weak indifference ( $\mu\approx 4,000$ ), preference/rejection ( $\mu>$ ;  $\mu< 6,000$ ) and strong preference/strong rejection ( $\mu>$ ;  $\mu< 10,000$ ); (c) *Agrarian income*, indifference ( $\mu=1,000\text{€}$ ), weak indifference ( $\mu\approx 15,000\text{€}$ ), preference/rejection ( $\mu>$ ;  $\mu< 25,000\text{€}$ ) and strong preference/strong rejection ( $\mu>$ ;  $\mu< 40,000\text{€}$ ); (d) *Public cost*, indifference ( $\mu=5,000\text{€}$ ), weak indifference ( $\mu\approx 25,000\text{€}$ ), preference/rejection ( $\mu>$ ;  $\mu< 50,000\text{€}$ ) and strong preference/strong rejection ( $\mu>$ ;  $\mu< 70,000\text{€}$ ).

Note (2): Qualitative criteria have been measured within NAIADe with a scale from 1 to 9, as follows: 1, completely bad; 2, very bad; 3, bad; 4, quite bad; 5, average; 6, quite good; 7, good; 8, very good; 9, excellent.



Among the numerous existing multi-criteria aggregation methods (for example, [76]), NAIAD (Novel Approach to Imprecise Assessment and Decision Environments) has been used to identify significant differences between the alternatives and order them. This method has certain characteristics [77, 78] that are appropriate to the analysis of the case study addressed. In the first place, it allows for the use of information of different types, both qualitative and quantitative (cardinal, stochastic, fuzzy), thus facilitating the integration of uncertainty in the model. Second, unlike other methods, NAIAD gives equal weight to each criterion, so that in our case the ecological, economic, and social dimensions linked to agricultural multifunctionality have the same relative importance. Finally, NAIAD also allows the completion of the so-called equity matrix (section 4.3), which reflects the degree of acceptance that stakeholders have with respect to the alternatives evaluated and which constitutes an element that facilitates the analysis of conflict.

The NAIAD process, however, requires the definition of the thresholds of indifference and preference that establish the distances between two values of the same alternative<sup>2</sup>. The thresholds of preference and indifference in qualitatively assessed criteria are automatically established by NAIAD. The thresholds of the quantitatively valued criteria have, however, been established (a) following that established in previous works [79, 80], (b) according to the maximum and minimum values of the different criteria and (c) according to the information obtained in the participatory process (see note 1 of Table 13).

#### 4.3. Equity matrix

The equity matrix is based on both the institutional analysis and the information collected during the participatory process, and shows the level of acceptance that each group of stakeholders expresses with each proposed alternative (Table 14). The degree of acceptance ranges from 1 to 9, with 1 being the value that reflects being in absolute disagreement and 9 the value of being in absolute agreement. This matrix is therefore the basis of social evaluation and is a key input of conflict analysis.

**Table 14.** Equity matrix.

Group of stakeholders	STAKEHOLDERS	ALTERNATIVES				
		A.1	A.2a	A.2b	A.3a	A.3b
Institutional	GPC – Ecological positions	3	6	6	7	9
	GPC – Traditional positions	5	6	6	3	1
	City Council of Mutriku	4	8	9	8	8
Technical	Debemen, HAZI, OCA, Geoparke	4	7	8	8	8
	EHNE Union	4	7	8	7	5

<sup>2</sup> The *threshold of indifference* is the maximum difference between the values of the same criterion for two different alternatives that does not establish any difference between the two (under this criterion). The *threshold of preference* is the minimum difference between values of the same criterion for two different alternatives that make one alternative preferred to the other (under this criterion). NAIAD establishes four thresholds: indifference ( $\mu=$ ), weak indifference ( $\mu\approx$ ), preference/rejection ( $\mu>$ ;  $\mu<$ ) and strong preference/strong rejection ( $\mu>>$ ;  $\mu<<$ ) [41, 78].

	ENBA Union	6	7	7	6	5
Economic	Traditional farmers	4	6	6	3	2
	Innovative farmers	4	8	9	8	8
Social groups	Ecologist groups	2	6	6	7	9
	Leisure groups	4	6	6	8	8

Source: Author's own compilation.

## 5. Results

### 5.1. Technical evaluation

In operational terms, NAIADÉ is a method of improvement whose aggregation procedure consists of the following [77]: (1) pairwise comparison of alternatives through preference relationships (pre-defined thresholds of indifference and preference); (2) calculation of preference intensity indices, which indicates how much better or worse an alternative is with respect to another; (3) aggregation of preference intensity indices and calculation of the indices  $\phi^+$  and  $\phi^-$ , that indicate how much better a certain alternative is compared to the rest and how much worse, respectively; (4) obtaining the ranking of alternatives according to the comparison between  $\phi^+$  and  $\phi^-$ , which is reflected as the intersection between both indices. This intersection is interpreted as a classification of alternatives, from most to least adequate.

According to the technical evaluation and the criteria used, the most favorable alternatives are 2b (C in Image 1) “Intense promotion of new agrarian models” and 3b (E in Image 1) “New agrarian models and intense promotion of the autochthonous forest”. Then, in a second degree of suitability, we have Alternative 2a (B in Image 1) “Medium promotion of new agrarian models” and 3a (D in Image 1) “New agrarian models and medium promotion of the autochthonous forest (within the Arno SAC)”. Finally, Image 1 shows that the least favorable alternative is Alternative 1 (A in Image 1) “Maintain the current dynamics (BAU)”.

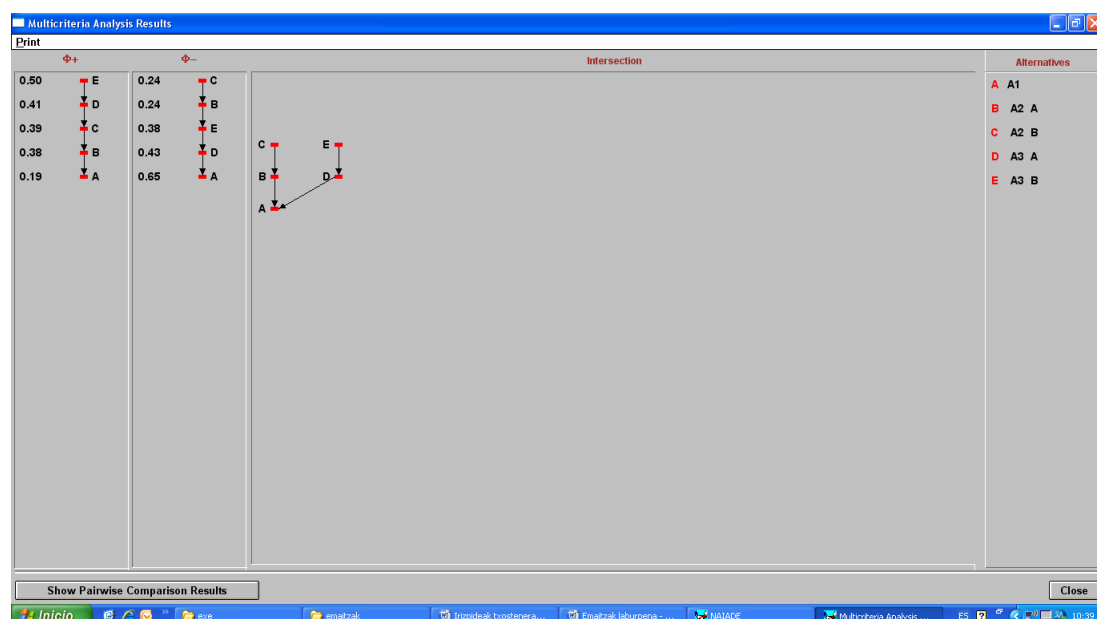


Image 1. Indices  $\phi^+$  and  $\phi^-$  and their intersection.

In the two alternatives that enjoy the highest degree of suitability (2b and 3b), a change is proposed in land use towards the promotion of innovative and job-creating agriculture and livestock rearing, although the intensity of this use varies according to the chosen alternative. With respect to the current situation, in Alternative 3b the forest policy, with a greater ecological component, also varies, as it carries high valuations in the criteria of landscape and biodiversity.

To test the robustness of the model, sensitivity analysis has also been carried out. For this, variations have been introduced in the initial parameters with the intention of reflecting the uncertainty and existing risk in the complex socio-ecological systems. Specifically, different variations have been made in the compensation ( $\gamma$ ) and credibility ( $\alpha$ ) indices, in line with what has been done in other research works [73, 81, 82]. As the results did not vary significantly after introducing the mentioned variations, we can assured that the results obtained are robust<sup>3</sup>.

The ranking of alternatives, however, not only depends on technical elements such as the selected indicators and the method of aggregation used, but also on the structuring of the problem under study. That is why the participation of stakeholders throughout the process is essential for the control of the results and to favor transparency [62, 83]. Thus, the results of the technical evaluation were contrasted with the stakeholders in the third group dynamics (section 3.2). In fact, the opinions of the stakeholders reflected divergent positions regarding the two technically better positioned alternatives.

## 5.2. Social evaluation: narrowing the conflict analysis

Social evaluation shows the position of the stakeholders in relation to each alternative, as well as the coalitions that can be formed between different stakeholders with respect to the same. Thus, social evaluation contributes towards analyzing in terms of conflict the existing disparities between stakeholders with respect to the alternatives. This analysis also contributes to the search for so-called "compromise solutions" [40, 41, 84].

Based on the equity matrix (section 4.3), NAIADe calculates a coalition dendrogram showing the similarities and disagreements among the different stakeholders and concluding which alternative each coalition considers most favorable, as well as considering alternatives with a lower degree of acceptance. In our case, the coalition dendrogram has been calculated for a degree of similarity of 0.68, in line with other investigations in this field [44, 48, 49, 67, 85].

As shown in Table 15, the results of the analysis lead us to conclude that there are three main coalitions. On the one hand, the coalition of the two agrarian unions accepts Alternative 2b as being more desirable and Alternative 1 as being the least desirable. The second coalition formed by the traditional positions of the GPC and traditional farmers prioritizes Alternative 2a, with 3b being the least desirable for them. Finally, the stakeholders of the most numerous coalition, formed by the ecological positions of the GPC, the City Council of Mutriku, the agents of rural development, the innovative farmers and the groups representing ecology and free time, agree that Alternative 3b is

<sup>3</sup> For any clarification the information relative to the sensitivity analysis can be expanded upon request.

the most desirable, while Alternatives 2a and 1 are the least preferred, respectively, and vetoed by this coalition.

**Table 15.** Coalitions of stakeholders with respect to the alternatives evaluated.

		Coalitions of stakeholders		
		EHNE Union, ENBA Union	GPC–traditional positions, traditional farmers	GPC–ecological positions, City Council of Mutriku, Debemen, HAZI, OCA, Geoparke, Innovative farmers, Ecologist groups, Leisure groups
Degree of preference	More	A 2b	A 2a	A 3b
		A 2a	A 2b	A 3a
		A 3a	A 1	A 2b
		A 3b	A 3a	A 2a (vetoed)
	Less	A 1	A 3b	A 1 (vetoed)

Source: Author’s own compilation.

According to this analysis, between the two most suitable alternatives under the technical evaluation (2b and 3b), Alternative 2b is the most appropriate insofar as it presents less confrontational positions among the stakeholders and, therefore, a priori a lower degree of social conflict. From this point of view, we can consider Alternative 2b as the compromise solution. In fact, it is the preferred alternative for the agrarian unions and the second most desirable for the traditional position of the GPC, while it occupies third position for the most numerous coalition of stakeholders. Alternative 3b, on the other hand, despite being equally suitable according to the technical evaluation, presents a high risk of social conflict, given that it presents more confrontational positions among the stakeholders. Both the traditional positions of the GPC and the traditional farmers consider it the worst of the alternatives and in fact they have manifested publicly against it on numerous occasions in the last few years, on the occasion of the proposals for new forestry policies made by the more ecological positions of the GPC.

**6. Discussion and conclusions**

The crisis of the traditional agrarian model and the change of land uses associated with it during the last decades show the need to look for new models of rural development. The multifunctionality of rural spaces raises the question of what sectors, functions and dimensions of the territory need to be promoted, taking into account also that rural land is a limited resource. Thus, public officials often face the challenge of promoting certain land uses to the detriment of others.

In this context, our case study has shown, first, that the SMCE is a relevant methodological framework for the evaluation of rural development alternatives at the municipal level. The various development alternatives have been valued considering the different functions of the rural environment, both economic, ecological and social, which has made it possible to consider the multifunctionality of these territories and evaluate the development alternatives properly. In this

process we have also worked with values of distinctly different natures, cartography, indicators and measurements in different units, and using different calculation procedures, all of which have allowed us to properly incorporate the *technical incommensurability* [40, 41] in the evaluation process.

Second, participation during the process has been active and dynamic, and the contributions of the stakeholders have been conclusive in decisive issues. The stakeholders have contributed to the definition of evaluation criteria, but above all to the construction of alternatives, given that those initially proposed by the team of analysts were substantially modified as a result of the second group dynamics. This highlights the importance of incorporating local, and not only scientific, knowledge into participatory processes by determining the evaluation object in a decisive manner. This also shows that the evaluation process has been efficient and transparent, and contributes to its results having greater legitimacy and social acceptance.

From the participatory process carried out, it can also be concluded, on the one hand, the existence of stakeholders with diverse and even conflicting interests and opinions on the rural development model to be implemented and the subsequent planning of the land. On the other hand, during this participatory process, the risk of latent conflict between different stakeholders has also surfaced, an issue reflected in the social evaluation. This is a case study, therefore, in which *social incommensurability* (*ibid.*) has also been adequately incorporated in the evaluation.

In addition, based on the results of the technical evaluation, three main conclusions have been deduced. First, the worst alternative is the continuation of current dynamics (BAU). Continuing with the progressive abandonment of agriculture and livestock is the least appropriate of the options under any of the assumptions analyzed, so it is necessary to propose policies that quickly reverse this trend in favor of a comprehensive revitalization of the agricultural and livestock sector.

Second, of all the alternatives evaluated, the most appropriate are 2b and 3b; both alternatives that involve renewing and reactivating the current agro-livestock model towards a more ecological and higher quality agriculture and livestock rearing. Alternative 2b proposes an intense promotion of new agrarian models, such as organic farming, greenhouse agriculture, fruit, and livestock farms aimed at producing high quality products. Alternative 3b, meanwhile, implies a more moderate enhancement of this agrarian model (one less livestock farm) and a substantial change in the forestry model, promoting native species in both the Arno SAC and the rest of the municipality. The two alternatives offer the same degree of technical suitability, having guaranteed the robustness of these results thanks to the sensitivity analysis.

These two alternatives, however, show two different models of rural development, both within the paradigm of multifunctionality but each enhancing different dimensions of it. In Alternative 2b the economic and social dimensions of multifunctionality are enhanced to the detriment of greater contributions of an ecological nature, while in 3b the opposite happens. Alternative 2b obtains better valuation in the economic and social dimensions, especially in attachment to the land and in public cost (an increase of 47,000 euros with respect to the current situation). This alternative ultimately proposes a model of rural development in which the social function prevails, a live rural environment is promoted, in which new agrarian practices allow for the maintenance of ecological balance and at the same time enhance human presence in rural areas, but without substantial changes in forest policy, which continues to favor the proliferation of conifers. On the contrary, Alternative 3b achieves worse valuation in the criteria that reflect the economic and social dimensions but much better in the ecological one (biodiversity and landscape); the public cost of this alternative would amount to

220,000 euros. This second alternative proposes a rural environment of greater environmental value, where the predominance of ecological criteria derive from a hypothetical new forest policy, and where human presence would be less than in Alternative 2b even though it would form a landscape better valued by the majority of the population by diminishing the presence of conifer plantations.

This case is therefore another example of the existence of trade-offs when implementing multifunctionality from the point of view of planning. As evidenced in other cases [23], it is difficult to avoid these conflicts between uses when translating multifunctionality into territorial planning, given that at the time of ordering land uses, the vocation of land use is enhanced towards a certain function (economic, environmental, social) to the detriment of other uses and/or functions. That is, in Alternative 2b land uses are promoted for agricultural activity, while in 3b this empowerment is less while at the same time the land for forest use is destined to favor autochthonous forest to the detriment of conifers.

The third of the conclusions is related to the social part of the evaluation. Of the two most suitable alternatives according to the technical evaluation, from the social point of view the solution 2b must be considered as the compromise solution. In addition to being technically adequate, it is also one of the most socially acceptable and carries least risk of conflict, as it is the preferred alternative for one of the coalitions of stakeholders and occupies the second and third place for the other two coalitions. On the contrary, however, Alternative 3b presents a greater risk of social conflict given that it is the most desired for the coalition with the largest number of stakeholders but is rejected by the other two coalitions. This social dilemma between both alternatives is due to the fact that forestry policy has provoked deep debates and disagreements in Gipuzkoa during the few last years, and it continues to be a subject that provokes confrontation between stakeholders with conflicting opinions.

The social analysis reveals the latent conflict that exists in Gipuzkoa and the entire Cantabrian coast, evidencing the divergent positions on the coniferous forests and their proliferation in recent decades. These discrepant positions are basically between the owners of rural land who defend the current forestry model with the aim of making that land profitable and the social groups that value the rural environment for its ecological and landscape values and as a place for leisure and recreation. However, the position of public institutions in this respect is mixed, depending, on the one hand, on the institutions themselves and on the scope of their competences and, on the other hand, on the divergent positions of public officials within each institution.

In our case study, it is worth noting the strength of the first group, that of the owners of the rural land, in an environment where most of this land is private. In fact, the hypothetical conversion of coniferous to native species depends ultimately on the decision of the owner of the land, regardless of any financial assistance granted. It also highlights the power conflict that exists within the GPC to the extent that stakeholders in the same institution hold conflicting positions with regard to forestry policy (i.e. traditional versus ecological positions). This institution has not followed the same policy line in recent years, and in this dispute between traditional and ecological positions, it seems that the former impose themselves more often on the latter, given that their greater resources have slowed the most daring ecological initiatives of this second group. The power asymmetry between the stakeholders becomes clear: not all the stakeholders have the same power during the participatory process or especially in the decision-making process. This, however, does not call into question the validity of the participatory process due to the reasons given above, although it may call into question



its effectiveness to the extent that some stakeholders have greater decision-making power over the alternatives evaluated.

But regardless of the direction to be taken by forestry policy, Mutriku must urgently take measures that reverse the decline of agricultural and livestock activity, given that it has been shown that continuing with the current dynamics (BAU) is the worst possible alternative and that, at the same time, the promotion of a new agrarian model is needed (as seen in both Alternative 2b and 3b).

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