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How Impactful Are Public Policies on Environmental Sustainability? Debating the Portuguese Case of PO SEUR 2014–2020

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Abstract: Sustainable development is a key feature of national, European Union and global development strategies. The main research goal is to provide evidence on how impactful public policies on environmental sustainability in Portugal are at the regional level, in various policy areas. In this context, this paper analyses the main impacts of the Portuguese Operational Programme for Sustainability and Efficient Use of Resources (PO SEUR 2014–20). The research uses a territorial impact assessment (TIA) methodology (TARGET_TIA) to assess these impacts in five analytic dimensions (economy with low emissions, adaptation to climate change, risk prevention and management, environmental protection and resource efficiency) in the five mainland Portuguese NUTS 2. It concludes that, in overall terms, PO SEUR produced low to moderate positive impacts in all NUTS II and analysed dimensions, but it was particularly positive in measures fostering adaptation to climate change, and less impactful in measures supporting an economy with low emissions and resource efficiency in Portugal. Despite data limitations, the research provided adequate evidence that key public policies supporting environmental sustainability in Portugal are largely ineffective and inefficient in view of their policy goals and allocated funding. To turn this scenario around, the process of project selection needs to undergo significant improvements to better adjust the regional needs on environmental sustainability-related issues to the available funding. Moreover, on a policy strategic level, there needs to be support for a prosperous, modern, competitive and climate-neutral economy in Portugal via concrete actions exploring environmental capital and a green economy in urban areas.

Keywords: green economy; PO SEUR; Portugal; public policies; sustainable development; sustainability

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1. Introduction

According to Sachs [1], humankind currently lives in an age of sustainable development. As the term implies, policies supporting sustainable development require the financing of policy measures toward environmental conservation, among several other dimensions [2]. Indeed, globally, the United Nations (UN) 2030 Agenda is largely forged with several sustainable development goals (SDGs) which directly and indirectly target environmental conservation measures in several policy domains (e.g., socio-economic development, urban development, ocean conservation, biodiversity, etc.) [3]. Likewise, in Europe, the adoption of the European Union (EU) Green Deal in 2019 marks a clear policy goal to improve the well-being and health of EU citizens and future generations, by providing (i) fresh air, clean water, healthy soil and biodiversity; (ii) renovated, energy-efficient buildings; (iii) healthy and affordable food; (iv) more public transport; (v) cleaner energy and cutting-edge clean technological innovation; (vi) longer-lasting products that can be

repaired, recycled and re-used; (vii) future-proof jobs and skills training for the transition; (viii) and a globally competitive and resilient industry [4].

The implementation of public policies requires, however, more than a simple strategy with clear and targeted objectives. It requires, for instance, sound and effective financial mechanisms [5]. In the EU territory, EU Cohesion Policy has served as a crucial policy tool to finance territorial development processes [6], which include support for environmental sustainability-related operational programmes (OP) or projects [7]. In Portugal, a dedicated OP of the 2014–2020 (Portugal 2020 Strategy) Cohesion Policy Framework was fully dedicated to supporting policy measures aimed at promoting environmental sustainability: PO SEUR–Operational Programme for Sustainability and Efficient Use of Resources (Programa Operacional Sustentabilidade e Eficiência no Uso de Recursos–in Portuguese). In sum, PO SEUR is supported by a multidimensional perspective of sustainability which is based on three strategic pillars: (i) supporting the transition to a low carbon economy in all sectors; (ii) promoting climate change adaptation and risk prevention and management; and (iii) protecting the environment and promoting the efficient use of resources [8].

As seen, the PO SEUR rationale for supporting sustainable development is essentially about the environment, as in most other similar policy programmes and policies [9]. Again, as in other similar programmes across the world, the social dimension of sustainability garners less attention since it is particularly difficult to operationalize [10]; it requires a sound mix of institutional capacity, adequate infrastructure, a sound macroeconomic environment, and adequate health and primary education [11], as well as public participation and an awareness of the benefits of sustainability [12]. Moreover, being a highly politicised concept [13] and an ingredient of social and political life [14], the notion of sustainable development is often strategically used by developed countries to control environmental unsustainable (and sometimes also sustainable) practices in developing countries [15]. This is not necessarily the case in Portugal, despite the rising ecological dangers of increasingly intense agriculture practices implemented in past decades [16]. In addition to the social (people) and ecological (planet) prisms, sustainable development covers domains of human dignity, partnership, justice and prosperity [17], thus requiring long-term potential action [18] with a sense of responsibility and accountability [19]. Furthermore, in the context of rising global urbanisation trends [20], sustainable development policies require a place-based approach [21] to the specific needs of urban areas [22], as well as an integrated urban development sustainable approach [23].

In this context, this article is particularly focused on assessing the main impacts of PO SEUR 2014–20 in the Portuguese mainland NUTS 2 (Norte, Centro, Lisbon Metropolitan area–AML, Alentejo, and Algarve–Figure 1) in five distinct analytic dimensions: (i) economy with low emissions; (ii) adaptation to climate change; (iii) risk prevention and management; (iv) environmental protection and (v) resource efficiency. These five dimensions were mostly selected based on the main axis of the PO SEUR intervention and related policy goals, and also on current literature which, for instance, identifies five main specific sustainability objectives to foster ecological policy goals [24]: (i) protection of natural spaces and biodiversity; (ii) responsible use of renewable energy; (iii) reduction of the use of non-renewable resources; (iv) protection of the natural environment; and (v) protection from environmental hazards and reduction of risks.

This research approach is both innovative and relevant. It is innovative because it presents a more detailed (regional and policy dimensional) analysis than those based on generic environmental impact assessments [25]; it is relevant because it can be used by policymakers at the regional level to assess the implementation of PO SEUR and where it should be improved in future policy strategic frameworks. Moreover, the analysis adds a new aspect to present discussions on the evaluation of the impacts of public policies supporting environmental sustainability processes while taking an interdisciplinary perspective.

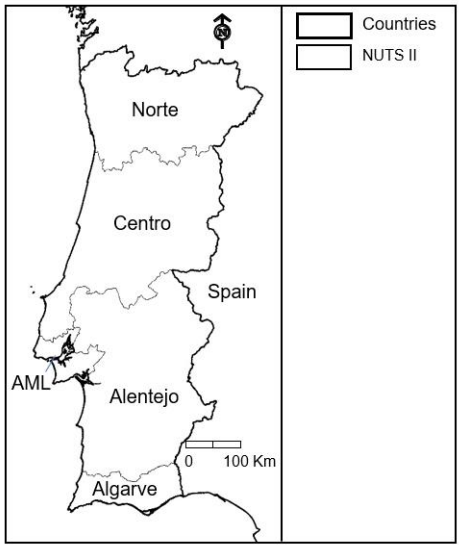

Figure 1. Portuguese mainland regions (NUTS II). Source: own elaboration.

2. Methodology

The research made use of a territorial impact assessment (TIA) methodology named TARGET_TIA (Figure 2) [26] because it has already been successfully used to assess the main impacts of EU Cohesion Policy in several EU Member States at the regional level and in EU cross-border cooperation programmes. In other words, TARGET_TIA has, over the past years, demonstrated its malleability and effectiveness in assessing all sorts of policies and programmes with potential territorial impacts in both ex-ante and ex-post evaluation phases, unlike existing ESPON TIA tools [27,28] which were mainly designed to assess ex-ante impacts of EU directives [26]. Moreover, having been perfected over the past decade by on-site implementation, TARGET_TIA can produce the required evaluation impact scores in a relatively short amount of time (two to three months) with a minimum research team of two to three elements [26].

In the current research, TARGET_TIA was used to assess the main ex-post impacts of PO SEUR in the already mentioned five distinct analytical dimensions and the five Portuguese mainland NUTS 2. For this, 30 interviews with regional and national entities (Table 1) involved in the implementation of PO SEUR, with at least five interviews per NUTS 2, were conducted to obtain a positive-negative impact score on each of the analysed dimensions. Here, even though the TARGET_TIA allows the possibility of assessing the estimated impacts in three counterfactual elements (short-term/sustainable; multiplier/substitution and exogenous/endogenous) the collected information was insufficient to use concrete scores in these parameters. Hence, the same score values of the positive-negative evaluation were imputed in them, so that the average impact score was not affected. These impact scores vary from −4 (very significant negative impacts) to +4 (very significant positive impacts) (Figure 3).

These impact scores are complemented by two evaluation elements to perfect the evaluation analysis. Firstly, a 'regional sensibility' score was obtained for each NUTS 2 and respective analytical dimension via a literature review. Ultimately, the regional sensibility to PO SEUR investment would be very high (1) in a specific dimension (ex: adaptation to climate change) if the needs of this region in this dimension were very high. This score would be 0 if the opposite is true. Three other intermediary scores were used: 0.25, 0.50 and 0.75. Moreover, a 'policy intensity' evaluation element was added, with similar scoring values, for each analytical dimension in each NUTS 2. Here, the higher the allocated funds, the higher the score, since a high positive correlation is expected between the amount of money used in each selected analytical dimension. Hence, this analysis was backed by the PO SEUR project database. It should be noted that the impact scores for Portugal mainland result from the arithmetic average of the scores for all the five mainland NUTS 2.

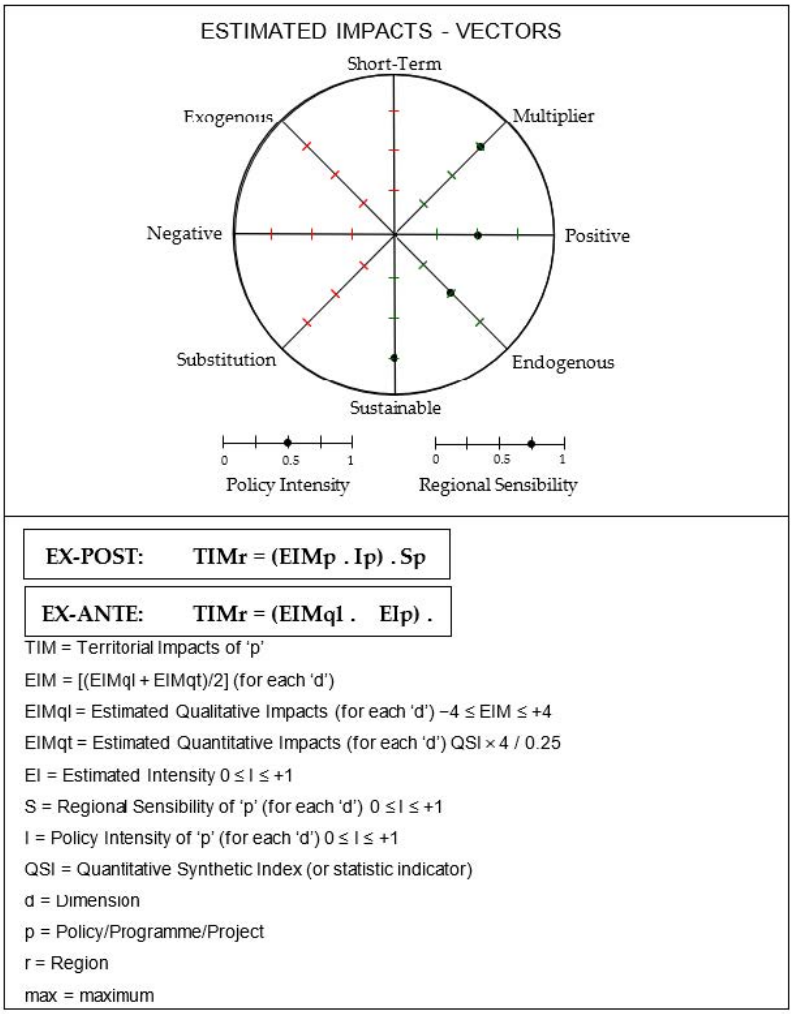

Figure 2. TARGET_TIA ex-ante and ex-post formulas. Source: [26].

Finally, a regional development trend (causality) score (from 0 to 1) was inputted into the model to make it more robust and relevant. Here, quantitative elements such as statistical indicators demonstrating a time trend (one or two years before the evaluated policy, programme, or project was implemented to one or two years after it was implemented) were used. Moreover, qualitative elements (from interviews) were also used to define this score. In particular, a score of 0 would signify zero causality in the development trends of the evaluated policy or programme, and a score of 1 is a maximum causality. These scores were obtained for the two analysed periods of time.

4 Very Significant Positive Impacts
3 Significant Positive Impacts
2 Moderate Positive Impacts
1 Low Positive Impacts
0 Null Impacts
−1 Low Negative Impacts
−2 Moderate Negative Impacts
−3 Significant Negative Impacts
−4 Very Significant Negative Impacts

Figure 3. TARGET_TIA impact scores. Source [26].

Table 1. List of interviewed entities.

NUT II	Entity	Regional Level
Norte	Comunidade Intermunicipal do Cávado	Intermunicipal
Norte	Águas do Norte	Regional
Norte	Comunidade Intermunicipal do Alto Minho	Intermunicipal
Norte	Câmara Municipal Santa Maria da Feira	Local
Norte	Comunidade Intermunicipal do Ave	Intermunicipal
Centro	Comissão de Coordenação e Desenvolvimento Regional do Centro	Regional
Centro	Comunidade Intermunicipal da Região de Coimbra	Intermunicipal
Centro	INOVA-Empresa de Desenvolvimento Económico e Social de Cantanhede	Local
Centro	Comunidade Intermunicipal da Beira Baixa	Intermunicipal
Centro	APIN—Empresa Intermunicipal de Ambiente do Pinhal Interior	Intermunicipal
AML	Águas do Tejo Atlântico	Regional
AML	Comissão de Coordenação e Desenvolvimento Regional de Lisboa e Vale do tejo	Regional
AML	Hyperion Renewables	Local
AML	SMAS Sintra	Local
AML	Câmara Municipal de Palmela	Local
Alentejo	Comunidade Intermunicipal do Alentejo Litoral	Intermunicipal
Alentejo	Águas Públicas do Alentejo	Regional
Alentejo	Câmara Municipal de Odemira	Local
Alentejo	Comunidade Intermunicipal do Baixo Alentejo	Intermunicipal
Alentejo	Câmara Municipal de Coruche	Local
Algarve	Universidade do Algarve Professor Dr. Thomas Panagopoulos	Regional
Algarve	Comissão de Coordenação e Desenvolvimento Regional do Algarve	Regional
Algarve	Águas do Algarve	Regional
Algarve	ALGAR-Valorização e Tratamento de Resíduos Sólidos	Regional
Algarve	Câmara Municipal de Faro	Local
Nacional	Direção Geral de Energia	National
Nacional	ZERO-Associação Sistema Terrestre Sustentável	National
Nacional	Laboratório Nacional de Energia e Geologia	NAtional
Nacional	Autoridade de Gestão do POSEUR	National
Nacional	AMA—Agência para a Modernização Administrativa	National

3. Results

3.1. Main Policy Impacts of PO SEUR

In the following, a synthesis of the main impacts of PO SEUR in (mainland) Portugal is presented, mainly supported by the information collected by means of the 30 interviews conducted with entities involved in the implementation of the PO. This means that the synthesis is based on the interviewees' knowledge, but also on their perceptions of the impacts, and as they all benefited financially from the PO, as seen in Tables 2–7, their perceptions cannot be totally disentangled from their general evaluations. This may therefore be one of the factors contributing to the relatively high positive impact scores obtained in basically all five analysed dimensions and in all NUTS 2.

Economy with low emissions: in this dimension, PO SEUR provided crucial support toward a carbon neutrality path. This was done by embracing a wide set of policy actions like, for instance, support for green public transport systems, by replacing old public transport fleets powered by oil-based fuels with those powered by hydrogen produced via green energy sources. These visible changes occurred mainly in the Lisbon and Porto Metropolitan Areas, which have the potential to promote a positive structural change in the

public transport paradigm in Portugal. On the negative side, some beneficiaries mentioned that it was not possible to achieve better results in this sustainability domain because of existing deficient municipal infrastructure, which made it impossible to conclude some projects related with the support to an economy with low emissions. In addition, unforeseen circumstances in the public procurement process related to the implementation of PO SEUR made it difficult to comply with the programme's submission timings. In addition, according to Alvarenga [29], a path toward an economy with low emissions requires a fast adoption of energy efficiency measures and technologies, which was particularly evident in several PO SEUR-approved projects, as debated in the next topic.

Adaptation to climate change: in this domain, PO SEUR was key in financing projects supporting measures to mitigate climate change (global warming) trends in Portugal. Crucially, several projects contributed to supporting the production of non-renewable energy sources, even though this only represented a small percentage (5.5%) of the total PO SEUR investment (Figure 4). In this regard, support for the production of green hydrogen was particularly evident, in contrast with the limited number of projects aimed at supporting the production of solar energy [2], which is still largely unexplored in Portugal [30]. Moreover, PO SEUR financed a range of projects exploring the potential of residual biomass, which is not always considered a green source of energy [31]; the investment granted to energy produced in offshore territories, in particular via the exploration of wave energy on the Portuguese coast, which can be especially effective in the area from Peniche to Nazaré [32]. On the other hand, the PO SEUR strategy was strongly aligned with the EU Strategic Energy Technology Plan [33] to promote new sources of renewable energy and the improvement in the energy efficiency of several public utility buildings. This is particularly relevant for Portugal since the residential sector is one of the primary energy-consuming domains in Portugal [34]. Another policy supported by PO SEUR was integrated forest management with the goal of combating forest fires in Portugal [35]. In particular, this PO financed the acquisition of video surveillance cameras for forest protection, the creation of new channels of supplies to deal with the fires that have devastated the country in past years, and significant investment in the prevention of forest fires.

Risk prevention and management: in this domain, PO SEUR financed several projects, directly and indirectly, supporting risks associated with climate change, via effective efforts made to protect the vast mainland Portuguese coastline which faces multiple challenges related to the coastal management policy [36]. In particular, several PO SEUR financed projects contributed to increasing the preservation of dune systems that have a direct effect on the quality classification attributed to Portuguese beaches. At the same time, this PO provided insightful help towards the regularization of the Mondego river banks, the restructuring and stabilization of the margins of the Tagus in critical areas, as well as the stabilization of slopes [37] of the castle of Palmela. It should be noted that some of the interviewees argue that PO SEUR was not sufficiently effective in mitigating all the risks faced by the Portuguese coastal areas, mainly due to a lack of sufficient funding.

Environmental protection: in this domain, PO SEUR provided crucial financial aid to extend and enhance special conservation areas in rural territories, as well as awareness-raising campaigns among the population that helped to promote the importance of these areas. In addition, several green spaces were created and improved in urban green spaces, in particular in the Algarve NUTS 2, which are considered critical in increasing good health and well-being for urban dwellers [38]. These projects also allowed a myriad of trees to be planted within cities, with direct known benefits for several areas, such as the value of energy savings, CO2 reduction, stormwater run-off reduction and increased real estate value [39]. Added to that, these projects contributed to improving the city environment and became key points of shade, which is especially relevant in the context of rising average temperatures in Portugal [30]. As far as the protection of species is concerned, PO SEUR, in collaboration with farmers' associations, assisted the preservation of the European bee by developing plans to combat the invasion of the yellow-legged hornet (Vespa velutina), which was first detected in mainland Portugal in September 2011 [40]. In

another context, PO SEUR provided a key vehicle for the development of selective waste management in Portuguese territory, in particular by fostering the reduction of plastic waste [41]. Additionally, the PO led to increasing efforts to promote the collection of bio waste to comply with related European directives. However, when compared to other EU countries, some interviewees expressed concern about the amount of waste that (still) goes to the landfill without any treatment, as well as the lack of incinerators, which prevents the recovery process of waste produced in the national territory in the long term [42].

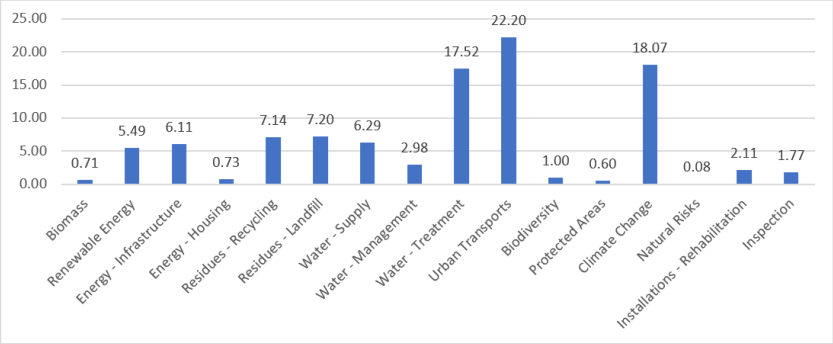

Figure 4. PO SEUR investment (%) per main policy area of environmental sustainability. Source: Own elaboration based on Portugal 2020 database.

Resource efficiency: in this domain, the PO SEUR was particularly important in improving water treatment and management-related infrastructure in Portugal, which absorbed around one-fifth of the total investment of the PO. In concrete terms, several projects contributed to building and renovating water treatment facilities and reducing water losses and processes to foster water reuse [43]. In almost every way, the PO also contributed to increasing the coverage of the sanitation supply network nationwide, in particular in more isolated areas [44], which would not be possible to reach without the support of this PO. Expectedly, these improvements contributed to the general quality of life of the population which benefited from these infrastructural investments. However, some interviewers from the AML noted the negative effects of unbilled water regulations to fight against the need to improve water supply-related infrastructure. Finally, PO SEUR allowed increasing planning in the domain of resource efficiency, mainly due to the fact that the PO was aligned with the national climate change adaptation plan and with the respective local programmes for climate actions. Moreover, when compared with the previous PO (POVT 2006–2013), the PO SEUR used georeferencing systems as one of the decisive factors in increasing its efficient planning capacity.

3.2. Policy Intensity

It is only logical that the impacts of public policies in a given policy domain are largely correlated with the amount of financing allocated in the analysed policy, programme, or project [26,45]. In the case of PO SEUR, available data from the Portugal 2020 database shows that, by September of 2021, PO SEUR allocated €1,869,337,554 to the mainland Portuguese NUTS 2 to support public policies to foster environmental sustainability processes in Portugal. As seen in Table 8, the 'resource efficiency' domain received the bulk of this investment (56%) whereas the 'economy with low emissions' and the 'adaptation to climate change' analytic dimensions received relatively low percentages of investment.

3.3. Regional Sensibility

The impacts of public investments depend on their regional sensibility or regional sensitivity as used in environmental impact assessment processes [46]. This element of policy impact evaluation was incorporated into the TIA methodologies later on [47,48] as a means to complement basic positive-negative impact assessment scores. For the PO SEUR analyses, the regional sensibility of each Portuguese mainland NUTS 2 was mostly based

on the recent information collected from three reports of the updated (2018) National Policy Spatial Programme (Programa Nacional da Politica de Ordenamento do Território–PNPOT in Portuguese) [49–51]. The following paragraphs summarize this regional sensibility to environmental sustainability investments in (mainland) Portugal. The respective analysis backs the regional sensibility scores shown in Tables 3–7 and 9.

Economy with low emissions: in mainland Portugal, endogenous resources are favourable to boosting energy production capacity through hydro, wind, solar or forest biomass solutions. Therefore, to combat depopulation and low population density trends, there is a need to focus on the forestry sector, grazing forestry (with the respective use of biomass) and on carbon storage in these forested areas, mainly in the central region of the country. Moreover, the development of technologies that promote the use of renewable energies is essential to reducing economic dependency on tourism activities in the Algarve and increasing the use of solar energy in all areas of the country, which is also suffering from the phenomenon of depopulation. Finally, urban centres (with a special focus on the AML) must improve energy efficiency indicators, as well as contribute to the reduction of greenhouse gas emissions.

Adaptation to climate change: in recent years there has been an increase in regional exposure to natural hazards in Portugal. For instance, coastal erosion and rising sea levels have contributed to the high risk of flooding in the Norte, Centro and Algarve regions. At the same time, the decrease in precipitation aggravates the processes of desertification and soil degradation in the Alentejo and Algarve regions, which constitutes a setback for the primary sector in areas that are highly dependent on such economic-related activities. In addition, water resources are also scarce due to the decrease in average rainfall, exposing the country to considerable periods of drought, which exacerbates the difficulties in preventing and fighting forest fires. It is also important to stress that the AML, due to the concentration of activities, has a special social and economic sensitivity to climate change in areas such as the average rise in sea level.

Risk prevention and management: the risk of flooding, as well as the critical areas prone to this phenomenon, have increased in recent years in Portugal. Coastal erosion has proved to be the main cause of the occurrence of this phenomenon and the consequences are visible in several areas of the country: the silting of the main maritime accesses to fishing ports in the northern region of the country and critical flooding areas in the streams of the Algarve region. In addition, dune systems also suffer from this instability, namely in the Central area of mainland Portugal. Hence, financial resources are being used to enhance and protect the country's coastline in various parts. The reduced agroforestry occupation of the land is another scourge that increases the risk of fires throughout the country. The small size of the properties, the abandonment of agroforestry activities, the inadequate use of the soil and the type of vegetation cover are all dimensions that can help to mitigate or increase the risk of fire.

Environmental protection: the country is developing at two speeds in terms of environmental protection. On the one hand, there are areas with high population densities on the coastline, associated with the coexistence of urban-industrial development with intensive agricultural and livestock farming. On the other hand, there is a vast depopulated interior territory, also facing socio-economic deprivation. In this context, it is urgent to establish plans to stop depopulation, combat the vulnerability of dune systems and minimize the impacts on surface water bodies. Various efforts have been made to stop the deterioration of natural areas, namely within the scope of the Natura 2000 network, which has contributed to the creation of a plan that encompasses areas of nature conservation in all regions of the country. Nevertheless, the promotion of areas of protected designation of origin has contributed to economically enhancing agricultural products and combating structural problems in the Portuguese forest area (with a focus on the Norte and Centro regions). At the same time, it has promoted the preservation of agricultural soils, through the maintenance of traditional and sustainable agricultural practices. Finally, less-polluting technology and fuels have contributed to reducing air pollution and establishing new

forms of energy production. However, in the specific case of Alentejo, photovoltaic solar production can cause problems for the conservation of the protected territory.

Resource efficiency: despite positive advances in past years, the improvement of water quality is still a major policy goal in Portugal, apart from the Algarve region, which presents very interesting results in this domain. There is also a need to improve the control of the over-exploitation of available water resources and the losses of water in the public network that still plague many regions in mainland Portugal. When it comes to the domain of waste treatment, it is important to pursue increasingly selective collection strategies which contribute to avoiding the deposit of waste in landfills. Moreover, the geological resources in the Portuguese territory are present in quantity and quality and the extractive activity is essential for regions like the Alentejo. In this context, there is a need to mitigate the loss of biodiversity and the environmental liabilities of former mining areas as essential steps for nature conservation. In extraction areas, rehabilitation actions are also necessary so that harmful situations for the environment and the region's heritage are not perpetuated.

Critically, the results of the evaluation were conditioned by the selection of territorial units of analysis (NUTS 2), which are necessarily very heterogeneous in terms of their geographical characteristics, development challenges and regional sensitivity to investments in the five chosen analytical dimensions. For example, the Norte region has a vast metropolitan area that is sensitive to environmental issues and relatively distinct from some of the vast and less populated areas in the remainder of the region. As such, impact scores resulted from an average assessment that necessarily has an inherent personal judgment. Moreover, this is something that is transversal to all types of similar impact assessment processes. On the other hand, it should be noted that it was necessary to obtain an assessment adjusted to the collection of different opinions in the interviews. Here, for example, some interviewees focused their opinion on very focused projects, and on very particular themes. On the other hand, other interviewees presented a more panoramic view of the interventions and respective impacts of PO SEUR. As such, it was necessary to carry out a detailed analysis of the content of the interviews so that the resulting impact scores were as closely adjusted as possible to the circumstances of the PO SEUR intervention.

Despite all the challenges and data limitations, in our view, the research provided useful results which demonstrate a largely ineffective implementation of public policies to foster environmental sustainability in Portugal. They are ineffective due to the overall low-to-moderate positive impacts obtained in the analysis for all territories, and especially in the 'economy with low emissions' and the 'resource efficiency' policy domains. This is a sign that there is much to be done in future investments in public policies supporting environmental sustainability in Portugal. For instance, the process to select the approved projects needs stronger criteria to consider the regional needs and potentials in this policy domain, rather than private interests. Moreover, national statistics need to produce further detailed regional environmental statistical indicators to improve the effectiveness of policy evolution, in particular in detecting the causality of these public investments in the environmental sustainability domain. Furthermore, fundamental is the will of national movements to comply with the initial funding share to finance environmental sustainability policies, which in Portugal 2020 was due to receive around 25% of the total financial package and ended up receiving around 16% so far. Connecting considerations should be highlighted for further analysis when assessing the impacts of these investments, by collecting data enabling a counterfactual analysis, which was not possible for the analysis presented here.

In summary, the evaluation produced within the scope of this study concluded that, in general, PO SEUR has had a positive impact on sustainability and efficiency in the use of resources in mainland Portugal from the period 2014–2020. However, this impact generally ranged from low to moderately positive impacts. In this regard, the highest positive impacts are highlighted in the 'adaptation to climate change' dimension, and less positive in the 'low emission economy' dimension (Tables 3–7 and 9). From a NUTS 2 level perspective, the Norte region registered the highest impact scores in contrast with the Alentejo region.

Table 2. Change in statistical indicators—2013–2021.

		Norte		Centro		AML		Alentejo		Algarve	
Analytical Dimension	**Indicator**	**2013**	**2021**	**2013**	**2021**	**2013**	**2021**	**2013**	**2021**	**2013**	**2021**
A: Economy with low emissions	Electricity production from renewable energy sources through new technologies (total) MW	98	119.2	439.33	485.4	166	183.2	3	13	3	16
B: Adaptation to climate change	Municipalities' environmental expenditure per capita (Protection of air quality and climate) (€)	0	0.7	0	0.5	0.1	2.4	0.1	0.2	0	1.9
C: Risk prevention and management	Burnt area %-Rural Fires lasting more than 24 h (No.)	4.9	1.3	1.7	1.1	0.2	0.1	0.2	0.2	0.1	0.6
D: Environmental protection	Municipalities' environmental expenses per capita (Protection of biodiversity and landscape)	8.8	14.9	10	21.6	13.9	23.4	10.9	21.2	14.5	43.7
E: Resource efficiency	Where is selectively collected, on average, per person, more and less garbage? kg/inhabitant-ratio	52.3	85.1	36.9	78.2	58.8	139.4	50.1	96.7	180.8	270.4

Source: National Statistics.

Table 3. PO SEUR Evaluation Impact Matrix–Mainland Portugal.

Analytical Dimension	**Impact Scores (−4/+4)/Counterfactual**					**Tuning Elements (0–1)**		**Causality–Development Trends (0–1)**		**Impact (Score)**
	Pos/Neg	**End/Exo**	**Sus/Sho**	**Mul/Sub**	**Average**	**Pol/Int**	**Reg/Sen**	**2014**	**2020**	**(−4/+4)**
A: Economy with low emissions	3.2	3.2	3.2	3.2	3.2	0.5	0.5	0.45	0.55	**0.598**
B: Adaptation to climate change	3.4	3.4	3.4	3.4	3.4	0.5	0.85	0.2	0.5	**2.190**
C: Risk prevention and management	3	3	3	3	3	0.5	0.7	0.25	0.35	**1.044**
D: Environmental protection	3	3	3	3	3	0.45	0.7	0.25	0.55	**1.508**
E: Resource efficiency	3.4	3.4	3.4	3.4	3.4	0.3	0.65	0.3	0.55	**0.946**
Average	3.2	3.2	3.2	3.2	3.2	0.5	0.5	0.45	0.55	**1.257**

Note: Pos/Neg: Positive vs. Negative; End/Exo: Endogenous vs. Exogenous; Sus/Sho: Sustainable vs. Short-Term; Mul/Sub: Multiplier vs. Substitution; Pol/Int: Policy Intensity; Reg/Sen: Regional Sensibility.

Table 4. PO SEUR Evaluation Impact Matrix–NUT 2 Norte.

Analytical Dimension	Impact Scores (−4/+4)/Counterfactual					Tuning Elements (0–1)		Causality–Development Trends (0–1)		Impact (Score)
	Pos/Neg	End/Exo	Sus/Sho	Mul/Sub	Average	Pol/Int	Reg/Sen	2014	2020	(−4/+4)
A: Economy with low emissions	3	3	3	3	3	0.5	0.5	0.5	0.75	**1.208**
B: Adaptation to climate change	3	3	3	3	3	0.25	0.5	0.25	0.5	**0.604**
C: Risk prevention and management	3	3	3	3	3	0.5	0.75	0.25	0.75	**3.036**
D: Environmental protection	3	3	3	3	3	0.25	0.75	0.25	0.5	**0.906**
E: Resource efficiency	3	3	3	3	3	0.25	0.5	0.25	0.5	**0.604**
Average	3	3	3	3	3	0.5	0.5	0.5	0.75	**1.155**

Note: Pos/Neg: Positive vs. Negative; End/Exo: Endogenous vs. Exogenous; Sus/Sho: Sustainable vs. Short-Term; Mul/Sub: Multiplier vs. Substitution; Pol/Int: Policy Intensity; Reg/Sen: Regional Sensibility.

Table 5. PO SEUR Evaluation Impact Matrix–NUT 2 Centro.

Analytical Dimension	Impact Scores (−4/+4)/Counterfactual					Tuning Elements (0–1)		Causality–Development Trends (0–1)		Impact (Score)
	Pos/Neg	End/Exo	Sus/Sho	Mul/Sub	Average	Pol/Int	Reg/Sen	2014	2020	(−4/+4)
A: Economy with low emissions	3	3	3	3	3	0.5	0.5	0.75	0.75	**0.375**
B: Adaptation to climate change	4	4	4	4	4	0.5	1	0.25	0.5	**3.500**
C: Risk prevention and management	3	3	3	3	3	0.25	0.5	0.25	0.25	**0.188**
D: Environmental protection	3	3	3	3	3	0.5	0.75	0.25	0.5	**2.513**
E: Resource efficiency	4	4	4	4	4	0.25	0.75	0.25	0.5	**1.313**
Average	3	3	3	3	3	0.5	0.5	0.75	0.75	**1.136**

Note: Pos/Neg: Positive vs. Negative; End/Exo: Endogenous vs. Exogenous; Sus/Sho: Sustainable vs. Short-Term; Mul/Sub: Multiplier vs. Substitution; Pol/Int: Policy Intensity; Reg/Sen: Regional Sensibility.

Table 6. PO SEUR Evaluation Impact Matrix–NUT 2 Área Metropolitana Lisboa.

Analytical Dimension	Impact Scores (−4/+4)/Counterfactual					Tuning Elements (0–1)		Causality–Development Trends (0–1)		Impact (Score)
	Pos/Neg	End/Exo	Sus/Sho	Mul/Sub	Average	Pol/Int	Reg/Sen	2014	2020	(−4/+4)
A: Economy with low emissions	4	4	4	4	4	0.25	0.75	0.5	0.75	**0.750**
B: Adaptation to climate change	4	4	4	4	4	0.5	1	0.25	0.75	**3.000**
C: Risk prevention and management	3	3	3	3	3	0.5	0.75	0.25	0.25	**0.563**
D: Environmental protection	3	3	3	3	3	0.75	0.75	0.25	0.5	**2.081**
E: Resource efficiency	3	3	3	3	3	0.25	0.75	0.25	0.5	**0.656**
Average	4	4	4	4	4	0.25	0.75	0.5	0.75	**1.332**

Note: Pos/Neg: positivos vs. negativos; End/Exo: endógenos vs. exógenos; Sus/Cur: sustentáveis vs. curto prazo; Mul/Sub: multiplicadores vs. substituição; Int/Pol: Intensidade Política; Sen/Reg: Sensibilidade Regional.

Table 7. PO SEUR Evaluation Impact Matrix–NUT 2 Alentejo.

Analytical Dimension	Impact Scores (−4/+4)/Counterfactual					Tuning Elements (0–1)		Causality–Development Trends (0–1)		Impact (Score)
	Pos/Neg	End/Exo	Sus/Sho	Mul/Sub	Average	Pol/Int	Reg/Sen	2014	2020	(−4/+4)
A: Economy with low emissions	3	3	3	3	3	0.75	0.25	0.25	0.25	**0.281**
B: Adaptation to climate change	3	3	3	3	3	0.5	1	0.25	0.25	**0.750**
C: Risk prevention and management	3	3	3	3	3	0.75	0.75	0.25	0.25	**0.844**
D: Environmental protection	3	3	3	3	3	0.5	0.75	0.25	0.5	**1.350**
E: Resource efficiency	4	4	4	4	4	0.25	0.5	0.25	0.5	**0.500**
Average	3	3	3	3	3	0.75	0.25	0.25	0.25	**0.858**

Note: Pos/Neg: Positive vs. Negative; End/Exo: Endogenous vs. Exogenous; Sus/Sho: Sustainable vs. Short-Term; Mul/Sub: Multiplier vs. Substitution; Pol/Int: Policy Intensity; Reg/Sen: Regional Sensibility.

Table 8. PO SEUR (2014–2020) investment per analytical dimension (% and 1000€).

	NUTS 2 PT MAINLAND					
	Norte	**Centro**	**AML**	**Alentejo**	**Algarve**	**Portugal(Mainland)**
Analytical Dimension	(%)	(%)	(%)	(%)	(%)	(%)
A: Economy with low emissions	5	2	10	5	3	5
B: Adaptation to climate change	1	9	0	2	8	3
C: Risk prevention and management	10	17	9	10	10	12
D: Environmental protection	32	22	16	22	13	24
E: Resource efficiency	52	50	65	61	67	56
Total	100	100	100	100	100	100
Analytical Dimension	1000€	1000€	1000€	1000€	1000€	1000€
A: Economy with low emissions	33,301	12,998	39,570	9588	1902	97,362
B: Adaptation to climate change	6235	46,053	1560	3606	5837	63,291
C: Risk prevention and management	66,842	88,314	37,669	19,765	7145	219,737
D: Environmental protection	212,316	113,335	64,238	41,752	9283	440,927
E: Resource efficiency	346,864	264,210	270,433	118,396	48,113	1,048,018
Total	665,560	524,912	413,472	193,109	72,282	1,869,337

Note: AML: Área Metropolitana de Lisboa. Source: own elaboration based on the Portugal 2020 database.

Table 9. PO SEUR Evaluation Impact Matrix–NUT 2 Algarve.

Analytical Dimension	**Impact Scores (−4/+4)/Counterfactual**					**Tuning Elements (0–1)**		**Causality–Development Trends (0–1)**		**Impact (Score)**
	Pos/Neg	**End/Exo**	**Sus/Sho**	**Mul/Sub**	**Average**	**Pol/Int**	**Reg/Sen**	**2014**	**2020**	**(−4/+4)**
A: Economy with low emissions	3	3	3	3	3	0.5	0.5	0.25	0.25	**0.375**
B: Adaptation to climate change	3	3	3	3	3	0.75	0.75	0	0.5	**3.094**
C: Risk prevention and management	3	3	3	3	3	0.5	0.75	0.25	0.25	**0.563**
D: Environmental protection	3	3	3	3	3	0.25	0.5	0.25	0.75	**0.688**
E: Resource efficiency	3	3	3	3	3	0.5	0.75	0.5	0.75	**1.313**
Average	3	3	3	3	3	0.5	0.5	0.25	0.25	**1.138**

Note: Pos/Neg: Positive vs. Negative; End/Exo: Endogenous vs. Exogenous; Sus/Sho: Sustainable vs. Short-Term; Mul/Sub: Multiplier vs. Substitution; Pol/Int: Policy Intensity; Reg/Sen: Regional Sensibility.

4. Discussion

The results of any policy impact evaluation are dependent on the data and methodology used. In this case, the analysis was beset by a few difficulties in gathering a wide set of statistical data related to the selected five analytic dimensions at the regional (NUTS 2) level and qualitative data from interviews to fully assess the causality of the PO SEUR investments. Moreover, the information obtained from the interviews was not sufficiently robust to analyse counterfactual elements of evaluation allowed by the selected methodology. Another challenge was the geographical diversity of all the analysed territories which, in some cases, encompass vast urban areas contrasting with vast depopulated and non-urban areas. Hence, a personal judgment was required to analyse the average implication of the PO SEUR investments in these territories taken as a whole. Even so, the collected information was, in our view, sound enough to produce six valid and robust evaluation matrices (one for mainland Portugal and one for each of the five mainland NUTS 2), not only based on a simple interplay of positive-negative impact analysis, but also with crucial policy evaluation elements echoing a 'regional sensibility' to the 'policy investments' and the 'policy intensity' of the investments, as well as their potential causality in the analysed territories.

Indeed, the presented analysis contrasts with most policy evaluations on environmental sustainability which tend to be supported by dominant economic evaluation techniques [24] based on the analysis of the sustainability mainstream conceptual triad of economy-society-environment [52,53] often following a theory-based evaluation approach searching for causal chains [54]. Crucially, much contemporary research acknowledges that sound sustainable development policies require organizational and institutional involvement [55], the analysis of environmental-related sectoral data [56], and innovation aspects related to environmental policies [54,57,58]. Currently, much attention is also placed on public regulations, NGOs' motivations and interactions between constellations of actors, [59], and international processes [60] related to environmental sustainability.

It goes without saying that judging the exact impacts of public policies, and specifically environmentally sustainable-related policies is tricky since there are many factors involved in their implementation and policies do not act in isolation. Even so, the interplay between qualitative and quantitative data, based on interviews, literature review and statistical and project analysis enabled this case study to provide crucial insights revealing a wide lack of efficiency and effectiveness of PO SEUR which had, in general, low to moderate positive impacts in all the analysed dimensions and territories. This is of particular concern in a country such as Portugal that, since entering what is now known as the EU (1986), and despite billions in financial aid from the EU Cohesion Policy, still has four out of its seven regions (NUTS 2) in the group of less developed EU regions. Indeed, a cursory glance at the Portugal 2020, and specifically the PO SEUR project databases, reveals a concerning conjuncture in which the criteria for project selection are not necessarily focused on the regional development needs/potential and the common interest, but rather on private interests of some sort. For instance, in a country blessed with a relatively high solar exposure, it is hard to explain why PO SEUR does not support the production of solar energy in urban areas, in particular in the southern regions of Portugal, where this source of renewable energy is still largely unexplored in Portugal in view of its potential exploration and in view of the energy dependence of the country. In this context, the presented analysis also contributes to highlighting how limited the impact of PO SEUR was on stimulating an economy with low emissions and resource efficiency, as a desirable path to a sound sustainable development trend in Portugal for the next decades. Thus, future programming periods of PO SEUR need to become more targeted in their investments by considering regional needs and potentials in a more effective manner.

5. Conclusions

The main goal of the research was to analyse the main impacts of the PO SEUR as a key Portuguese public policy tool to foster environmental sustainability processes

in mainland Portugal and the respective five NUTS 2. It applied a TIA methodology (TARGET_TIA) to produce impact scores in five analytical dimensions (economy with low emissions, adaptation to climate change, risk prevention and management, environmental protection and resource efficiency) in all these regions. Three main conclusions emerge from the analysis:

Firstly, despite all the challenges related to a lack of data at the regional level, the methodology used enables us to obtain an impact assessment analysis that is as detailed as possible. The main reason for that was the methodological possibility of using a 'regional sensibility' approach to identify the policy investment needs of the regions analysed in the five policy dimensions under analysis. In addition, a 'policy intensity' analysis of the PO SEUR investments in all these dimensions per region added to the precision of the impact analysis. Finally, statistical data was used to ascertain potential causalities of PO SEUR on these five policy domains at the regional level. The use of all these elements contributed to fine-tuning the impact scores obtained via 30 interviews with local, regional, intermunicipal and national stakeholders.

Secondly, the results obtained should be read with care. More concretely, comparable regional statistics on environmental sustainability did not permit a solid causality analysis. On the other hand, the qualitative data obtained during the interviews was not sufficiently robust to perform a counterfactual analysis of the evaluation. Finally, several interviewees are interested parties in PO SEUR which may influence their statements. Even so, the collected data is sufficiently robust to validate the obtained impact scores in each region and analytical dimension. In essence, further research on the impacts of PO SEUR should incorporate a large number of interviews with the inclusion of academic experts, which was not possible in this analysis.

Thirdly, and based on the previous statements, the analysis concluded that the PO SEUR had an overall low to moderate positive impact on environmental sustainability in mainland Portugal during the period 2014–2020. The highest positive impacts were registered in the 'adaptation to climate change' dimension, and the least positive in the 'economy with lower emissions' and 'resource efficiency' dimensions, despite the fact that the latter received the bulk of the PO SEUR investment. From a regional perspective, the Norte NUTS 2 presented more positive impact scores than the remaining mainland NUTS 2, and the Alentejo region presented the least positive impact scores. It can also be concluded that the impacts of the PO SEUR in all five analytical dimensions varied significantly from region to region. Even so, 'economy with low emissions' had quite low positive impact scores in all regions. This demonstrates that the EU policy goal towards a transition to a green economy in Portugal is not being sufficiently supported via existing policy instruments to finance environmental sustainability projects. In this stance, in our view, a higher emphasis should be placed on strategic policies toward financing 'green economy' related projects in all Portuguese regions in future environmental sustainability programmes.

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