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The interactions of rewilding at a landscape level: *a stakeholders' perspective*

Two case studies on the Iberian Peninsula

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ABSTRACT

Rewilding is a landscape approach for ecosystem restoration, combining social and ecological components. The impact of rewilding on key stakeholders in rewilding landscapes however remains widely unknown. In order to uncover the interactions of rewilding interventions with landscape stakeholders, this thesis aims to answer the research question; ***'How do rewilding interventions interact with key stakeholders in rewilding landscapes on the Iberian Peninsula?'***

The method is a qualitative multiple-case study analyzing two rewilding landscapes on the Iberian Peninsula, The Greater Côa Valley and the Iberian Highlands, both part of the Rewilding Europe network. Interviews were conducted with 23 respondents consisting of key informants and key landscape stakeholders. During the analysis, the Social Ecological Systems Framework (SESF) was used to visualize and relate the different actors, governance systems, resource units, resource systems, their interactions, and the outcomes, within a given social, economic, and ecological context.

The key stakeholder groups identified are agriculture, hunters, public authorities, eco-tourism, and local communities & education. The main type of interactions that have been identified are (1) conflicts, (2) new collaborations, (3) changes in ecological interactions, and (4) changing opinions about rewilding. These interactions lead to the following categories of outcomes: (1) new networks establishing, (2) regional identity developed, (3) economic impact, (4) policy changes, and (5) ecological improvements. The findings suggest that rewilding benefits from collaborative landscape stakeholders and that a long-term horizon is key for rewilding success.

This thesis illustrates that rewilding teams would benefit from engaging with key landscape stakeholders early on and aim to identify win-win solutions with all stakeholder groups. Future research can build on the findings of this thesis by applying the SESF on rewilding landscapes in a European context and by looking in-depth at the key stakeholder groups identified.

Despite criticisms and lack of a shared definition, rewilding remains a promising social-ecological approach to ecosystem restoration in practice, demonstrating that a systemic landscape approach can create tangible results with both the ecological and social components of the landscape.

Key Glossary

Landscape stakeholders refer to any type of stakeholder in the rewilding landscape that interacts with the rewilding interventions.

Rewilding interventions refer to actions implemented by the rewilding organization in the landscape. These interventions can be either ecological or social. A large variety of interventions exists. Some interventions can be targeted at very specific groups, while others have a broader impact in the landscape.

Ecological rewilding interventions are implemented to realize the ecological ambitions of rewilding and include the reintroduction of species, hydrological measures, or creation of ecological corridors.

Social rewilding interventions are implemented to provide technical, social, or financial support to landscape stakeholders. The aim of these interventions is either to mitigate the negative effects of ecological interventions or to build on the positive effects created by these ecological interventions.

Interactions refer to the interactions between the rewilding intervention applied by a rewilding organization in the landscape and the landscape stakeholders. This interaction can either be positive or negative.

INTRODUCTION

The **restoration of ecosystems** has been coined to be a key solution to multiple short- and long-term problems including climate change mitigation, biodiversity loss, and economic benefits (Atkinson et al., 2022; Bodin et al., 2022; Hobbs & Norton, 1996). Ecological restoration is generally accepted by governments as an important goal as exemplified through its inclusion in policy documents by governments and institutions including the EU with its nature restoration policies, and by the UN with its Decade for Ecosystem Restoration (Atkinson et al., 2022; Bodin et al., 2022; Hobbs & Norton, 1996). The thinking around ecosystem restoration has a long history with a large variety of ideas around the type of interventions that are needed to restore ecosystems.

The dominant narrative in the ecosystem restoration literature has moved from merely focusing on the ecological components of restoration to include the idea that ecosystem restoration efforts should consider other relevant components and take into account the needs of various stakeholder groups in the landscape in order to be more effective (Arts et al., 2017; Ban et al., 2013; César et al., 2020; Fischer et al., 2021; Hobbs & Norton, 1996; Perino et al., 2019). In this thesis, these other components of restoration are referred to as social components and include the components that are not ecological, including the social-cultural, political, and economic components of restoration.

The social components that are part of ecosystem restoration projects are found to be persistent barriers to restoration success, more persistent than the ecological barriers of those projects, and therefore require particular attention (Cortina-Segarra et al., 2021). Ecological interventions can therefore not be seen as independent from the social systems to which they are connected and social components should be included in the analysis to measure the success of ecological restoration (Arts et al., 2017; Ban et al., 2013; César et al., 2020; Fischer et al., 2021; Hobbs & Norton, 1996). This systemic approach toward restoration has been referred to as the 'landscape approach' (Arts et al., 2017; Hobbs & Norton, 1996).

Rewilding can provide a landscape approach for ecosystem restoration. Rewilding is a restoration approach that promotes self-sustaining and complex ecosystems by restoring key ecological dynamics and functions while reducing human control (Burnet et al., 2021; Carver et al., 2021; IUCN, 2021; Jepson et al., 2018; Lorimer et al., 2015; Pereira & Navarro, 2015).

Rewilding has an eco-centric origin (the term originates from the notion of 'wilderness'). The ecological approach of rewilding has been based on the "3Cs" (core areas, corridors, and carnivores) (Carver et al., 2021; Jepson et al., 2018; Lorimer et al., 2015; Perino et al., 2019; Soulé & Noss, 1998). Over the past decades, rewilding has developed into a landscape approach not only focusing on ecological components but involving key social components of ecosystem restoration by involving different landscape stakeholders including agriculture and tourism (Burnet et al., 2021; Carver et al., 2021; Jepson et al., 2018; Jepson & Schepers, 2016; Lorimer et al., 2015; Massenberg et al., 2023; Pereira & Navarro, 2015; Perino et al., 2019; Wang et al., 2023). Furthermore, rewilding has also been used as an approach to restore a connection between humans and their natural environment and promote a co-existence instead of a duality between humans and nature (Carver et al., 2021; Lorimer et al., 2015; Massenberg et al., 2023) The development of rewilding as a concept has not been coherent but has taken a variety of interpretations over the years, which has led to a fragmented definition of the concept among scientists (Carver et al., 2021; Perino et al., 2019). Additionally, rewilding has been criticized to exclude people from the landscape (Perino et al., 2019).

Even without a generally accepted definition, rewilding projects on the ground are being developed and the rewilding movement is growing rapidly (Jepson et al., 2018; Jepson & Schepers, 2016; Lorimer et al., 2015; Perino et

al., 2019). In Europe, the implementation of rewilding practices has taken off over the past decade under the umbrella of Rewilding Europe, a European NGO with the aim to make rewilding mainstream and implement its principles on a large scale across Europe. According to Rewilding Europe and its partners, rewilding is based on the following principles: (i) restore ecosystem processes and dynamics (biotic and abiotic), (ii) take inspiration from the past to shape future natures, (iii) move up a scale of rewilding within the constraints of what is possible, (iv) work towards the ideal of passive management, (v) create new natural assets that connect with modern society and economy, (vi) work with restored forces of nature to find solutions to societal problems, and (vii) reconnect conservation policy with public conservation sentiment (Jepson & Schepers, 2016). The combination of these principles demonstrates that rewilding has the potential be a systemic landscape approach for ecological restoration and that it aims to include other landscape stakeholders (Jepson & Schepers, 2016).

In literature, the impact of rewilding has been discussed both on a meta-level as well as on a case level. Various ecological rewilding interventions have been discussed; the restoration of trophic chains by means of species reintroductions, creating ecological corridors, and the restoration of hydrological processes, are some examples (Carver et al., 2021; Jepson et al., 2018; Lorimer et al., 2015; Perino et al., 2019). However, the social components of rewilding including the (potential) collaborations and conflicts with other landscape stakeholders, have not been studied to the same extent, even though literature has repeatedly indicated the importance of the social components of rewilding in practice (IUCN, 2021; Lorimer et al., 2015; Massenberg et al., 2023; Wang et al., 2023). This is especially important because ecological rewilding interventions can lead to conflicts with other landscape stakeholders, for example with agricultural businesses (Ceaușu et al., 2015; Lorimer et al., 2015; Massenberg et al., 2023; Pellis, 2019; Perino et al., 2019; Wang et al., 2023).

The lack of knowledge on how exactly these rewilding interventions play out in practice, and how these interventions interact with landscape stakeholders has led to the initiation of this thesis, which aims to foster an understanding of the interactions between rewilding interventions and landscape stakeholders.

In order to demonstrate these interactions, this thesis analyzes the relationships between rewilding interventions and the broad set of landscape stakeholders in two specific rewilding landscapes on the Iberian Peninsula: The Greater Côa Valley (GCV) and the Iberian Highlands (IH). The Iberian Peninsula was selected as the study area because this region provides an interesting and comparable setting for research. First, because these two areas have similar socioeconomic and climatic characteristics. Second, because both areas are managed by local teams that are part of the Rewilding Europe movement. Furthermore, the researcher had access to these rewilding projects and their teams. The central research question of this thesis is: ***'How do rewilding interventions interact with key stakeholders in rewilding landscapes on the Iberian Peninsula?'***

Key landscape stakeholder groups were identified during the research process, and each of the research sub-questions is related to one stakeholder group. By answering the main research question this way, it allows for an in-depth perspective on each of the landscape stakeholder groups to firmly grasp the interaction between the rewilding intervention within the specific context and dynamics of that stakeholder group. The following sub-questions were therefore created:

1. *How do rewilding interventions interact with **agriculture**?*
2. *How do rewilding interventions interact with **hunters**?*
3. *How do rewilding interventions interact with **public authorities** ?*
4. *How do rewilding interventions interact with **eco-tourism**?*
5. *How do rewilding interventions interact with: **local communities & education**?*

THEORETICAL FRAMEWORK

To analyze the interactions of rewilding in practice, a theoretical framework is needed that combines both the ecological and the social components and links them together in a sophisticated manner. Multiple frameworks have been developed to support research of complex systems in which ecological and social components are researched in relation to each other. This field has developed into a research domain called **Social-Ecological Systems (SES)** research frameworks (Ban et al., 2013; Binder et al., 2013; Ostrom, 2009). Binder et al. (2013) compare ten leading SES frameworks based on their purpose, conceptualization of the social system, conceptualization of the ecological system, and interaction between the social and ecological systems. They conclude that the research specific context must be taken into account when selecting the appropriate framework.

As the aim of this research is to gain a qualitative understanding of the interactions of rewilding interventions with a variety of landscape stakeholders, the method for analyzing the rewilding landscapes' SES should account for a broad variety of rewilding interactions with different landscape stakeholders (direct-indirect; positive-negative; quantitative-qualitative). Simultaneously, the large variety of rewilding interventions (large scale-small scale; short term-long term; social-ecological) should be accounted for in the framework to analyze the SES. A fitting SES framework for rewilding landscapes requires a balance between social and ecological components and an ability to both include macro- and micro level aspects such as ecosystem functioning, species information, stakeholder relationships, economic impact, and conflicts. Furthermore, the framework should be flexible and adaptive to be customized to the specific case at hand. Building on the Binder et al. (2013) SES framework comparison, a framework was selected that is able to capture this complexity and diversity.

1. The Social-Ecological Systems Framework

The **Social-Ecological Systems Framework (SESF)** (Figure 1) was selected as most appropriate method for this thesis. The aim of the SESF was first and foremost to create a shared set of principles and guidelines to facilitate research and communication about SES (McGinnis & Ostrom, 2014; Ostrom, 2009). Originally developed by Elinor Ostrom in 2009, this framework allows for a qualitative assessment of the different components that are part of the social and ecological domains. The SESF has been created in the light of systems with common-pool resources and was the result of various multidisciplinary collaborations across different research domains.

The SESF allows for an iterative research approach in which key variables are being defined along the course of the research process. Furthermore, the SESF provides a common framework in which the social and ecological components of multiple cases can be combined by co-developing the case studies, and the variables can be added iteratively based on the case-specific characteristics allowing for a high degree of adaptability (Ban et al., 2013; Binder et al., 2013; McGinnis & Ostrom, 2014; Ostrom, 2009; Thiel et al., 2015; Vogt et al., 2015).

The SESF defines variables at different 'tiers' that are combined into a comprehensive framework that is highly versatile depending on the specific case and the context to which it is applied. The SESF consists of six core systems (first tier variables): Resource Systems (*RS*), Resource Units (*RU*), Governance Systems (*GS*), and Actors (*A*), Interactions (*I*), and Outcomes (*O*). The *RU* are part of the *RS*, meaning the *RS* provide the context in which the *RU* act. The same is the case for *GS* that define and set rules for the *A*, acting within those *GS*. The *I* are where the other four first tier variables interact with each other and leave space for case-specific interpretation. The *O* box contains the outcomes of the *I* box, representing the results of the *I* between the different subsystems (Ostrom, 2009; Thiel et al., 2015; Vogt et al., 2015). These six core systems each consist of second-tier

variables that make the framework more specific and these can be adapted to the research context, making the framework adaptive and flexible (Binder et al., 2013; McGinnis & Ostrom, 2014; Thiel et al., 2015).

The operationalization of the framework is done by defining case-specific second-tier variables. The *GS* could refer to for example a nation, a municipality, a department, a network, or an organization. The *A* second-tier variable could be for example a livestock farmer, a community member, or a business owner. The *RS* can represent ecosystem characteristics such as landscape degradation, and the *RU* could relate to specific species or other elements that are part of *RS*.

These can have *I* in different ways with the other variables of the framework, for example by new collaborations, conflicts, or ecological interactions. *I* lead to *O* such as ecological improvements, economic results, or the establishment of networks. The whole system is impacted by external drivers that are accounted for on the system boundaries (see figure 1), namely (1) the social, economic, and political settings, and (2) the related ecosystems.

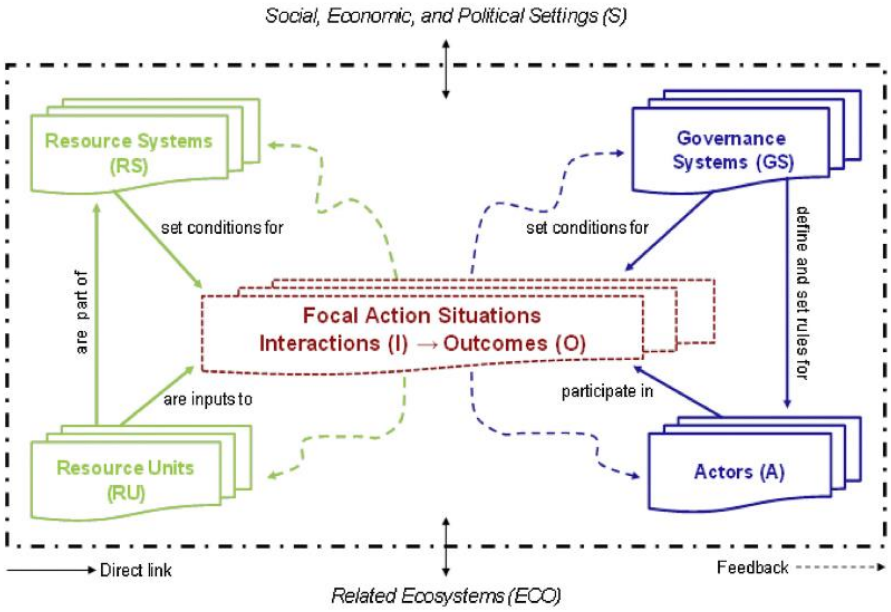

Figure 1: A Visual Representation of the Social Ecological Systems Framework (SESF) *(Thiel et al., 2015)*

2. Development of the SESF

Since its creation, criticisms and suggestions for improvements to the framework have been proposed by the scientific community. Thiel et al. (2015) look at a variety of studies in which the SESF was applied and evaluate the internal, external, and construct validity of the different studies. They found a high variety of contexts in which the SESF is applies and variables are not measured consistently, making it often difficult to compare between cases. Thiel et al. (2015) therefore conclude that the SESF community should develop consistent definitions and ways of measurement and that the SESF seems especially applicable for explaining the relationships between different variables and the interactions between those variables.

Partelow (2018) provides a comparison between different study types and study contexts that have used the SESF, such as qualitative diagnosis of a case study, quantitative diagnosis of a case study, and a meta-analysis of literature. Partelow (2018) suggests that the SESF should develop into specific versions of the framework for different sectors, so that adapted versions will include the most relevant variables for each sector, for example for small-scale fisheries and forestry.

As the SES framework has its origin in the social sciences domain, other scientists have argued that ecological variables are not accounted for sufficiently in the model (Vogt et al., 2015). Vogt et al. (2015) have attempted to expand the original SESF and expand it with more ecological specificity to enhance the consideration of the ecological complexity embedded in SESs. Specific ecological second-tier variables that stem from the ecology scientific community have been proposed by Vogt et al. (2015), increasing the validity and specificity of the SESF. These variables include for example population dynamic under *RU* and ecological connectivity under *RS* (Vogt et al., 2015).

The SESF does provide the researcher with flexibility in selecting the appropriate second-tier variables to include in the framework. The iterative research process when selecting these second-tier variables is needed when researching complex SESs. As this thesis is an explorative, qualitative thesis, the flexible and iterative nature of the SESF fits the research approach. The systemic nature of the SESF allows for an integrative view of the landscapes on which this thesis is focused. As a systemic, place-based approach, rewilding case studies provide excellent content for applying the SESF. This thesis views two rewilding cases from a SESF perspective, and in doing so stretches the domain of the SESF into rewilding landscapes. The SESF further seems applicable to the rewilding case studies because it is found to be especially useful in visualizing and explaining the relationships that exist between different variables of the SES (Binder et al., 2013; Ostrom, 2009), allowing for an explanation of the interactions between rewilding interventions and landscape stakeholders (*A*).

METHODS

In order to answer the exploratory research question, a **qualitative research approach** will be used. Qualitative research approaches in environmental sciences allow for an interpretation of observations, flexibility of design and a systemic perspective of phenomena (Roudgarmi, 2011; Yin, 2009). These characteristics match with the flexible, qualitative, and systemic character of the SESF.

A **multiple case study approach** was used for this qualitative study. A case study allows for the development of an in-depth perspective for each case, aiming to define and understand the cases in-depth (Roudgarmi, 2011; Yin, 2009). As the interactions between rewilding interventions and landscape stakeholders have not been researched to this extent, this in-depth understanding is beneficial for this study to demonstrate which mechanisms are at play. Using multiple cases allows for an initial testing of the generalizability of the findings for each of the cases (Yin, 2009), and to better show the expected complexity of rewilding interactions across different landscapes.

1. Case selection

The geographical focus on the Iberian Peninsula was chosen for feasibility and scientific reasons. Both rewilding areas are relatively close to one another, which enhances the accessibility for the researcher. Furthermore, there are few language barriers because the researcher speaks Spanish and English and is therefore able to communicate with most of the relevant landscape stakeholders. The two case studies selected on the Iberian Peninsula are the Iberian Highlands (IH) and the Greater Côa Valley (GCV), and were selected simultaneously. The scientific reasons to select these two cases are (1) because they are the two largest and most developed outspoken rewilding projects on the Iberian Peninsula and are thus likely to provide interesting insights into rewilding practices in that region, and (2) rewilding practices were started at different moments. In GCV, the first rewilding activities started in 2013 (Jepson et al., 2018), however the current rewilding team started its work in 2018. Whereas in the IH, rewilding activities commenced in 2022, eight months before the data collection period of this thesis. This difference will allow for an insight into which rewilding interventions can have rapid results in the short term and others that require a long-term horizon.

2. Data collection

In this multiple case study approach, various types of data were used resulting in data triangulation. The main types of data used in this study are documents and semi-structured interviews (for interview protocol, see Appendix II). Combining multiple types of data enhances the credibility and validity of the thesis and decreases the research bias (Yin, 2009), leading to a comprehensive understanding of the interactions of rewilding with landscape stakeholders.

For both cases, contacts were established with the rewilding organizations and their teams in the respective countries: Rewilding Portugal and Rewilding Spain. The main supporting documents that were used, were the rewilding management plans for the GCV and the IH. These plans, developed by each of the local rewilding teams, provided the researcher with a comprehensive insight into the rewilding interventions planned, the specific aims of each rewilding intervention, and the landscape stakeholder these interventions were targeted. These management plans were mainly used to select the stakeholder groups for the interviews and to prepare relevant interview protocols.

The main source of data however were the semi-structured interviews. Two different groups of interviewees were created: (1) key informants on rewilding interventions and (2) the landscape stakeholders and their representing organizations. To analyze the interactions of the rewilding interventions with landscape stakeholders, a semi-structured interview method was used for both groups. The semi-structured interview approach allows for an iterative approach in which probing questions based on the answers of the interviewees can lead to new insights, while still ensuring that the main concepts will be covered during the interviews. Furthermore, the semi-structured interview approach is both flexible and versatile and allows for a rich understanding of the phenomenon that is being studied (Kallio et al., 2016).

The interview manuals were developed based on the theoretical framework (the SESF), the existing literature on rewilding and the rewilding management plans for both areas, which have been made available to the researcher by the Rewilding Portugal and Rewilding Spain teams.

Interview protocols were made in English and Spanish, and the interviews were recorded with the permission and informed consent of the interview participants. Interviews were conducted in both Spanish and English and most interviews were fully transcribed by using the software of Atlas.ti, except for three interviews that are documented only by the notes of the researcher. All interviews were conducted by the researcher in person, except for 1 interview that was conducted online. In total, 23 interviews were conducted of which 12 in the GCV and 11 in the IH. Of these 23 interviewees, 11 were key informants and 12 were landscape stakeholders. The average duration of the interviews is 29 minutes.

3. Interviews

For an overview of all interview participants, see Appendix I. Interview participants in the key informant group consisted mainly of team member of the local rewilding teams and additionally some experts were interviewed. The aim of the semi-structured interviews with the key informants is to get a firm grasp on the interventions taken, the objectives of those interventions, and the main accomplishments and bottlenecks that have been experienced with these rewilding interventions. These interviews have provided the opportunity to learn in-depth on the rewilding interventions and their intended effects on the different landscape stakeholders.

To ensure a diversity of perspectives on the rewilding interventions, a list of stakeholders was developed to cover a broad spectrum of sectors, each with varying interests in the landscape. For a full overview of research participants, see Appendix I. The types of participants include the following categories:

(1) Farmers and their representatives
i.e. cattle and sheep farmers and their representatives.

(2) Wild food brands
i.e. sustainable producers of local products

(3) Nature guides
i.e. wildlife and nature guiding organizations

(4) Eco-tourism businesses
i.e. eco-tourism accommodations

(5) Government representatives
i.e. local government officials

(6) Nature management authorities
i.e. someone working for the formal nature management authorities

(7) Hunting community representatives
i.e. a hunter or a representative or the hunter community

(8) Educational representatives
i.e. someone involved in educational activities

These categories were inspired by existing literature (Lorimer et al., 2015; Pellis, 2019; Perino et al., 2019), by the rewilding management plans for each area (Rewilding Portugal, 2022; Rewilding Spain, 2023), and by the interviews with key informants. In addition, the local rewilding teams have advised on which type of stakeholders are interacting with rewilding interventions and could therefore be a valuable source. The local rewilding teams have supported in accessing a number of these landscape stakeholders, which otherwise would not have been accessible directly as an outsider. The rewilding team members have provided the researcher with suggestions on landscape stakeholder categories and specific individuals to interview. These suggestions were used by the researcher where relevant, and subsequently contacted. Additionally, various stakeholders were contacted without reference from the local rewilding teams, to strengthen the representativeness among the research respondents. In the SESF analysis, all stakeholder categories are coded as the different *A* second-tier variables. A semi-structured interview protocol was used for both groups of interviewees (Appendix II).

4. Data analysis

After the interview data collection phase, the data was coded in two rounds. The coding software Atlas.ti has been be used for this process. During the first round, the coding was performed based on the first-tier variables of the SESF, creating eight main categories of codes: Resource Systems; Resource Services & Units; Governance Systems; Actors; Interactions; Outcomes; Social, Economic & Political Settings; and Related Ecosystems. During the second round, the second-tier variables were identified and grouped within each of the eight first-tier variables. This process has been applied for both case studies, which thereafter have been merged into the creation of one SESF demonstrating the SES of rewilding landscapes on the Iberian Peninsula, which is visually represented in Figure 2.

5. Research ethics & reflexivity

To ensure legal and ethical data collection, an agreement for 'informed consent' was drafted in English, Spanish, and Portuguese (Appendix III). This agreement was presented to each participant upon engaging in the interview, and the researcher carefully explained the meaning of each section to ensure proper understanding. This informed consent agreement safeguards the rights and responsibilities of both researcher and participant. All interviews were conducted based on a voluntary agreement; no payment was extended to research participants. All interviews were conducted by the main researcher of this thesis without intervention of third parties.

Doing so, the researcher has aimed to gather truthful perspectives of the landscape stakeholders without steering their opinions and experiences. By probing the participants with relevant and specific questions, the researcher attempted to gather the true perspectives of the landscape stakeholders in relation to the landscape and the rewilding interventions. In this, the researcher has at all times attempted to pose questions in neutral form to avoid bias. However, the affiliation of the researcher with the local rewilding teams could be interpreted as a predisposition by the interviewee.

Furthermore, the positive stance of the researcher towards rewilding may have influenced the interviewing process at some points, despite efforts to minimize this influence.

Bias was further minimized by extensive collaboration of the researcher with multiple rewilding experts, including the direct supervisor of this thesis (Ass. Prof. S. Dressel at Wageningen University & Research), which has enhanced the quality of this thesis by building on expert feedback and opinions.

RESULTS

The findings of the SES analyses on the Iberian Peninsula have been summarized in the SESF (Figure 2). The framework shows the different components that are part of the SES in the IH and GCV rewilding landscapes.

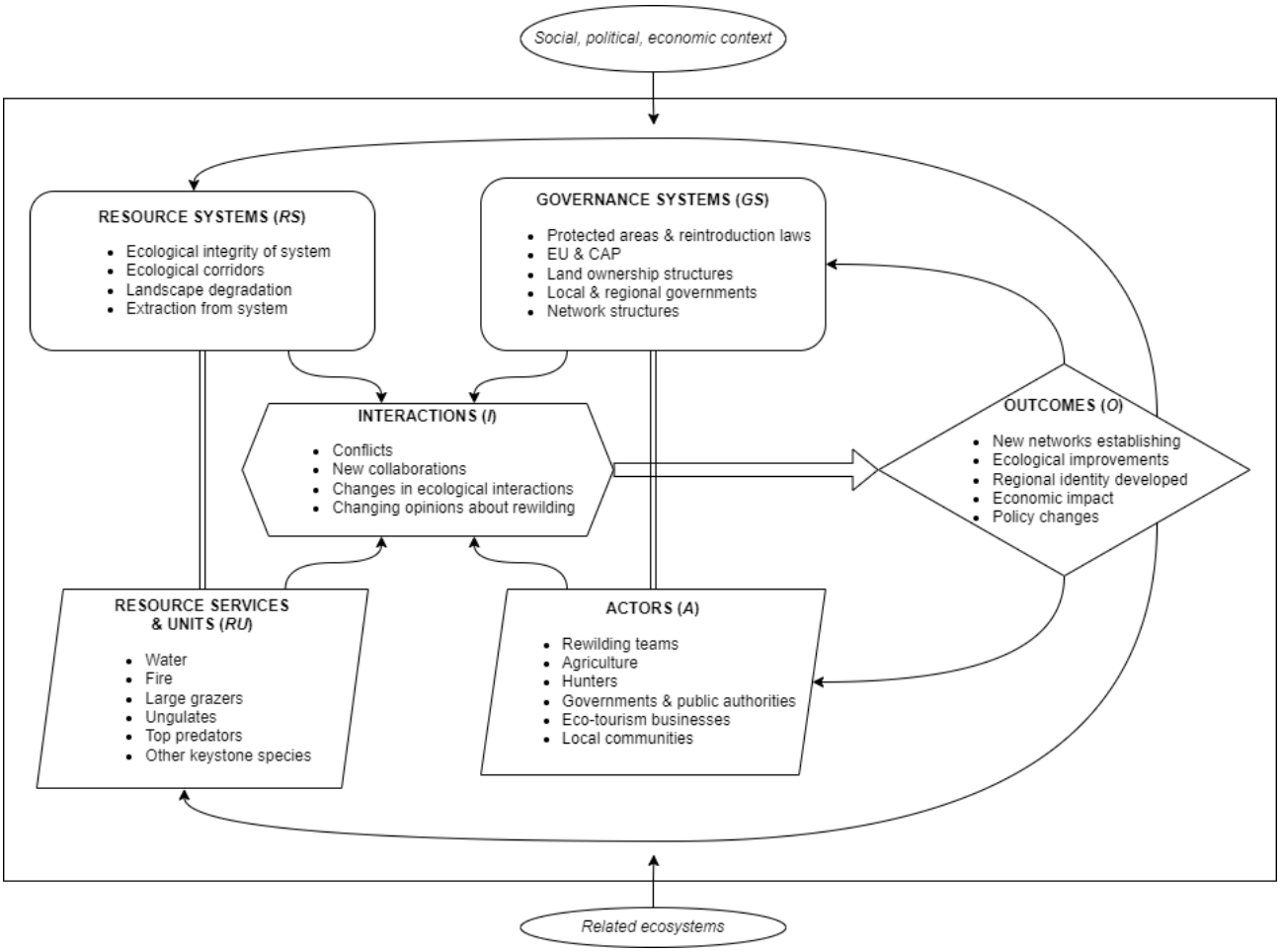

***Figure 2: The SESF applied to rewilding on the Iberian Peninsula**. The six main first-tier variables are (1) Resource Systems, (2) Resource Units & Services, (3) Governance Systems, (4) Actors, (5) Interactions: Activities & Processes, (6) Outcomes. Social, Economic & Political Context and Related Ecosystems provide context to the landscapes. Each main category has been split into specific variables identified in the landscape (second-tier variables). The arrows indicate the interactions between the different variables, also showing the feedback from the outcomes of the interventions.*

1. Landscape Context

In order to understand the *I* in the SESF, the current situation and the context of the landscape must first be understood. Two storylines have emerged as being strongly impactful on the current situation in both rewilding landscapes, therefore these will be discussed first to set the context for the the analysis per key stakeholder group.

I: Social & Economic context

The social and economic context in the GCV and the IH is challenging, with various issues and trends impacting these rural communities. The landscapes both have a strong depopulation trend. Young people have been moving away to cities and abroad to pursue academic, social, and economic opportunities, which has led to a decreasing and rapidly aging population in the landscapes.

A representative from APAG (The Provincial Association of Agriculture) in Molina de Arágon, part of the IH landscape, describes the impact of the declining population: *"So here the towns, of course, are very small and it happens that young people don't want to live in these towns and they leave, they prefer to work at almost anything rather than stay here. So I have seen since I have been here 30 years, in those 30 years, almost all the livestock farmers have retired. And despite the fact that they already had the farms, the warehouses, the infrastructures, they had everything, their sons preferred another job. They have not wanted to continue their father's work. And the same is the case for the crop farmers"*

The landscapes here have always been hard to inhibit due to a low quality of basic conditions. As stated by a social historian and archaeologist in the GCV: *"This landscape has never been very grateful to people because you know there's no soil. It's very dry. It's very hard to get a piece of land here with water and enough ingredients to survive. So people need to push and push and push, and it's so demanding and the identity of the community is built on this. The recent history of the region is so fragmented because people abandoned this region to survive, to find a better life, they disconnected to this landscape."*

The demographic changes have also caused a drop in economic activities in the region. The local and regional markets for (agricultural) products have become smaller and combined with environmental problems, many agricultural businesses stopped their activities over the past decades. This is illustrated by a shepherd in the GCV, who explained that it is much harder to sell his cheese and his wool in the area today than it was before, because of the depopulation. These trends have made life harsher for the remaining inhabitants and there is a general sense of dissatisfaction about the current socioeconomic conditions among many groups of people in the areas.

II: Ecological Context

Another persistent factor that is affecting both landscapes is landscape degradation. Climate change is visible on the Iberian Peninsula and is already having strong impacts. The main issues regarding landscape degradation in the area include increasing drought intensity and occurrence, the decrease in water availability during the summer months, and the intensity and occurrence of wildfires. These trends impact the agricultural production systems and their economic viability. A cattle farmer from the GCV explains: *"The river goes dry much longer during the summer and there are almost no fish anymore. The grasses don't get enough water, so I have to buy hay in Spain to give my cattle enough to eat."* Team Member 2 of the GCV team says: *"Because of climate change, which is already here, we do see that it's getting a lot hotter and a lot drier. And basically, this area which was already pretty marginal for agriculture, it's becoming even more so. Even the livestock raising, which is sort of the thing that people could still do here because the land is not very productive, is now also becoming difficult because of the lack of water"*. A representative from APAG (The Provincial Association of Agriculture) in Molina de Arágon further illustrates the economic impact of droughts*: "The drought has caused higher costs, production costs. This year it is feared that the bad harvest will raise the price of straw a lot"*.

Additionally, missing ecological factors in the landscapes have been found to create an ecological imbalance in the natural and semi-natural systems. As described by Team Member 2 of the IH: *"There are missing actors in the whole ecosystem and our main objective is to restore all of those natural processes, to restore the trophic chain"*. Certain keystone species are missing from the landscapes and are needed to

maintain the landscape and its functions. These species include large grazers, beavers, scavengers and top predators. The missing species each perform their own ecological functions in the landscapes and their absence or decrease in the landscape has resulted in dysfunctional ecosystems.

Natural grazing provides an illustrative example that is being felt across Europe. Cattle and sheep have been grazing most landscapes on the Iberian Peninsula over the past centuries, maintaining a semi-open mosaic landscape, combined with crop farming systems and natural areas. Because of the declining conditions described in the previous section, agricultural activity has decreased in many areas. This has resulted in grazing animals disappearing because farmers have left, which has led to an increase in scrubs and resulted in an ecological imbalance in many parts of the landscape that were historically grazed by farm animals. This has created the need for another form of grazing on the land and therefore the rewilding teams in the GCV and the IH are reintroducing semi-wild large grazers including sorraia horses and tauros. These species have the potential to open up the landscape again, creating a mosaic landscape with less shrubs and thereby decrease the speed that forest fires spread across the landscape. As Team Member 2 of the IH explains about the effect of large grazers: *"That [large herbivores] are missing. We expect them to open more the vegetation to create a more mosaic-like structure with more diversity [...], because if not now, the scrubs [...] will take over".*

Another example are beavers. Beavers are known to build dams and could be a natural solution for storing more water in the area. As explained by Team Member 2 of the GCV: *"You can increase water retention across large areas, but for that truly there is one species which does it best and that's the beaver."* She adds to that: *"There's a lot of political debate at the moment about creating more dams. [Dams] can be quite damaging because they obviously have very high impacts on the ecosystem. They destroy habitat, they destroy communities. And so having the beaver as an alternative solution to the same problem is something that we want to lobby for."*

Multiple other species are mentioned as key to bringing back ecological integrity to the landscapes including the Iberian wolf, Iberian Lynx, healthy populations of ungulates, and various species of vultures.

Lastly, the landscapes have become more fragmented. Protected areas with thriving populations have been separated from one another, leading to isolated wildlife populations. This brings the need to create corridors in the landscape, as explained by Team Member 1 in the GCV: *"So from our wildlife comeback strategy is not only about reintroductions but about the animals that reach the landscape that can travel safely, can settle, can breed."*

2. Rewilding Interventions

The main aim of rewilding is to allow natural dynamics to return over and let nature thrive. However, rewilding also has social objectives. As a systemic landscape approach, rewilding is directly related to ecological, social, economic, and political components. Rewilding interventions are very diverse and include both ecological as well as social interventions. As described by a professor on ecological restoration: *"Rewilding puts a lot of emphasis on improving not only nature, but also benefiting people".* Therefore, certain rewilding interventions have a strong social component. These can provide the necessary conditions for ecological rewilding interventions as explained by Team Member 1 of the GCV: *"The social interactions are the first door to get to the ecological interventions, so the ecological interventions happen next".*

Rewilding interventions are inherently different from one another (see Table A & B for an overview). The overall aim is to find win-win among *A* in order to materialize ecological rewilding on the ground.

Table A: Greater Côa Valley

Objectives	Interventions	Interactions
Restore a larger area of land under that increases connectivity in the Côa Valley.	Acquiring land (1000 ha, 2x 500ha) from private local landowners and other available land.	Small landowners
	Agreements with landowners (often hunting associations) to restore ecosystems and increase ecological connectivity.	Hunting associations; Farmers; Other landowners
	Grassland restoration through land stewardship, often with hunting associations.	Hunting associations; Farmers; Other landowners
	Creating easements to protect land for nature conservation in perpetuity.	Local communities; Small landowners
Restore ecosystem webs (habitat, prey, predator, scavenger).	Natural grazing with tauros and rewilded horses to create and maintain a mosaic of habitats that reduces fire risk and supports populations of main prey. This will be done through the combination of owned areas and land custody agreements.	Local communities; Farmers; Hunters; Local & Regional governments; Nature tourism businesses
	Habitat restoration for the return of Roe Deer.	Nature management authorities; Hunters; Nature tourism businesses
	Hormonal corridors to encourage movement (and thus connectivity) for Red Deer.	Nature management authorities; Hunters; Nature tourism businesses
	Authorization and legalization to leave carcasses in the field.	Farmers; Local & regional governments
Decrease threats and conflicts between people and wildlife.	Increased surveillance and collaboration with law enforcement. Priority areas for wolf and other wildlife, actively searching for snares and carrying out fire surveillance in the months with higher risk.	Hunters; Local Communities
	A network of wildlife ambassadors (Côa network).	Nature tourism businesses; Hospitality businesses; Wild food brand owners
	Wolf damage preventive measures for farmers (Livestock guarding dogs and wolf-proof fences (electric and metallic)).	Farmers

	Regulate hunting by creating a participatory management plan for partridge, rabbits and ungulates.	Hunters; Local & regional government
	Non-toxic (lead-free) ammunition will be tested.	Hunters
Build a scalable nature-based economy that improves the socio-economic situation of local communities.	Large-scale business plan for the Côa valley resulting in a sustainable financial situation, identify opportunities, weaknesses.	Nature tourism businesses; Hospitality businesses; Wild food brand owners
	At least 3 business plans for local entrepreneurs developed.	Nature tourism businesses; Hospitality businesses; Wild food brand owners
	8 people trained as wildlife guide with good ecotourism practices.	Nature tourism businesses
	Wild food brand certification developed.	Wild food brand owners
	Creating a group of at least 30 accredited producers, and increase their sales.	Wild food brand owners
	Producers and local business benefit from the grand route and the land art & culture festival.	Nature tourism businesses; Hospitality businesses; Wild food brand owners
Boost awareness, education and pride towards rewilded landscapes.	Child & youth clubs created in primary and secondary schools.	Education; Local communities
	Seminars, field visits and peer exchange on carnivore damage prevention, good practices and other issues with local communities, authorities, media and other relevant stakeholders developed.	Education; Local communities; Local & Regional government
	National rewilding strategy building awareness and pride.	Local Communities

Table B: Iberian Highlands

Objectives	Interventions	Interactions
Restore trophic chains: key or flagship species that have disappeared from the area are restored.	Restoration of scavenger guild (bearded vulture, cinereous vulture, red kite).	Farmers; Nature tourism businesses
	Reintroduction of black woodpecker.	Nature tourism businesses
	Experimental release of Iberian Lynx.	Local communities; Nature tourism businesses
Restore natural grazing: restored as a natural process through large herbivores.	Natural grazing in arid areas with wild ass (kulan) to restore habitat for steppe birds (e.g., Dupont's lark).	Nature tourism businesses; Farmers
	Natural grazing to restore burned areas (tauros, horses, Iberian ibex).	Nature tourism businesses; Local communities; Farmers
	Natural grazing to create a mosaic landscape (tauros, ungulates, horse).	Nature tourism businesses; Local communities
Rewild rivers: habitats restored and managed for connectivity and species dispersion.	River restoration & monitoring: dam removal in Tajo River (3 dams).	Nature tourism businesses; Local communities
	Study river connectivity for Iberian Desman & 3 fish species.	Nature tourism businesses; Education
	Restoration of lagoons and surrounding grasslands in steppe habitat.	Nature tourism businesses
Rewild forests: forest management oriented to protection of old-growth forests, carbon storage and timber valorization.	Creating old-growth forest reserves through direct compensation, voluntary carbon compensation, sponsorship of unique trees.	Nature tourism businesses; Local & regional government
Transform hunting concessions: demonstration that sustainable hunting is an opportunity for conservation and new socio-economic activities.	Lease strategic hunting ground rights, base the business on wildlife watching.	Hunters; Local & regional governments; Nature tourism businesses

Develop rewilding experiences: new business models based on the natural, social, and cultural resources present in the area.	Landscape business plan development.	Wild food brand owners; Local communities; Hospitality owners; Wildlife tourism businesses
	El Hosquillo: Inspirational rewilding landmark.	Wildlife tourism businesses; Local communities
	Support tourism opportunities.	Hospitality owners; Wildlife tourism businesses; Wild food brand owners
	Explore business models for natural grazing.	Farmers; Hunters; Local & Regional governments
Involve the local population & communication: increased knowledge and support for rewilding actions, showing how they have a positive impact on local and national level.	Information and education about rewilding.	Local communities; Education; Wildlife tourism businesses
	Engaging key stakeholders in the area.	All relevant stakeholders

3. Interactions of rewilding interventions with key stakeholder groups

In this section the most prominent *A* are discussed in the context of their *I* with the rewilding interventions. This allows for an in-depth perspective on how the rewilding interventions in the table above are implemented in the landscapes and demonstrate the functioning of the SESF of rewilding in the Iberian Peninsula in practice from an actor-centric perspective.

I: Agriculture

The remaining agricultural sector provides certain barriers regarding wildlife reintroductions. Firstly, agricultural businesses are very hesitant about conservation activities in general because they fear that rewilding objectives may interfere with their operations. Furthermore, they also fear that more restrictions and policies may accompany the rewilding activities. These tensions are additional to the economic problems and the degrading landscapes. Therefore, it is key for the rewilding teams to establish good relationships with farmers. Team Member 2 of the IH says: *"There are just a few farmers here and we try to have a good relationship with them. All [...] animals have different functionalities in the ecosystem. So it's good [for the land] if we can combine [grazing by] sheep, horses and tauros. [...] It's a perfect combination. So we try to have a good relationship with the shepherds."*

The reintroduction of large grazers can lead to conflicts with crop farmers because they could eat or damage their crops and fields. For this reason, all the semi-wild grazers that are being introduced, need insurance, to ensure the incurred damages will be reimbursed. As illustrated by Team Member 1 of the IH: *"It can [...] be complicated with the farmers but the most important thing is to discuss with the farmer and have some meetings with them. If the animals [...] leave the [dedicated rewilding] area where you have grazing rights and they would go to a crop and eat a crop [of a farmer] [...]. We have insurance for the animals, so if they go eat a crop, we discuss it, we bring somebody that is independent and calculates how much damage has been done and then the insurance will pay."*

Cattle and sheep farmers are impacted by the return of the Iberian wolf, which they fear will kill their livestock. As illustrated by a cattle farmer from the GCV: *"Most farmers don't [care] much about the existence of the wolf. If a wolf takes down one of their livestock, all wolves are [considered] the enemy and can be shot."* The wolf has been eradicated from both areas by farmers and hunters but is now making a return on the Iberian Peninsula. The fear of farmers appears to be grounded, considering past and recent experiences where livestock has been killed by wolves. Team Member 1 of the GCV says: *"When I started working in the landscape, there was a pack of wolves, so there were more wolves back than now, but the conflict was huge. And it wasn't solved in a good way, [...] so wolves were persecuted"*. In the GCV, the implementation of 'co-existence' interventions for farmers and wolves has been an important part of the work. These interventions include the provision and training of guarding dogs to protect the livestock and the donation and co-investment for fences to protect the animals at night.

For the IH, wolves are not a problem yet but could become a problem soon. The fear for the return of the wolves is so high that certain stakeholders who do sympathize with the return of the wolf, still hope the wolf does not return because they fear the social unrest that it could cause in the IH. A natural guide in the IH says: *"I prefer that the wolf does not come because there is still a lot of fear and ignorance regarding [the wolf]."* The IH team is currently preparing a co-existence approach for when the Iberian wolf will appear again.

Some farmers are positive and receptive to these co-existence measures. However, other farmers are skeptical about the support that is promised, because promises in the past regarding compensation for wolf damages made by the government have not always come through and are very slow, according to a cattle farmer in the GCV.

The initial results of the co-existence measures in the GCV seem promising, even though this is just the beginning. Farmers who initially were skeptical, are starting to participate in the program. Team Member 1 of the GCV says: *People that were skeptic [about] using electric fences, are now starting to use electric fences. That was not possible some years ago. People who thought that livestock guarding dogs didn't work to protect cattle that are in extensive management all year round, now see [that] it's possible. So we're passing from a stance of "no way this cannot be done, this is not possible, this doesn't work" to [...] an increased number of people participating [in the co-existence program]"*

However, certain measures are not as effective yet, including the guarding dogs which are not accustomed to the presence of wolves and could thus be surprised by them. A shepherd in the GCV says: *"There used to be more wolves. The dogs are not accustomed to the wolves nowadays. They didn't grow up with wolves. But the dogs do help, and they also help against the foxes."* As the presence of the wolf in the GCV is increasing, a pack may soon settle in the area which would require a rapid scale-up of co-existence interventions for livestock farmers.

Lastly, the existing EU Common Agricultural Policy (CAP) subsidies provide incentives to farmers that may be contradicting a more nature-inclusive and rewilded landscape. For example, the CAP stimulates and subsidizes extensive, unfenced grazing, which leads to conflicts with the increasing present Iberian wolves in both the GCV and the IH, because wolves may attack unfenced animals. The GCV rewilding team is trying to push for more logical and coherent rules and regulations. Team Member 1 in the GCV says: *"CAP, the common agricultural policy, has been creating the wrong incentives in the landscape, like [incentives for] having more heads of livestock without protection, that has created a very strong conflict with the wolf."*

II: Hunting

Another key actor group in both rewilding landscapes is the hunters. The hunters, who extract wildlife from the landscape, have traditionally had a large support base among local communities and still enjoy that support base today. As Team Member 1 in the IH notes: "*In all families [...] there is someone who is a hunter. Yeah, it's quite a thing."* Hunting is rooted in the identity of the landscape. This has resulted in a large influence of the hunters and their associations on local and regional governments. Hunters influence policymakers in their decision-making process regarding hunting rights and population estimations. This causes tensions between hunting and conservation interests, as illustrated by Team Member 1 the GCV: *"We are involving hunters in species monitoring, so they at least know what they really have, because they overestimate numbers and species abundance. They put species on the list that are not even here."*

In both the GCV and the IH, most of the land is hunting ground, leaving little space for wildlife to live and breed free of hunting activity. Furthermore, the so-called 'trophy hunters', often coming from larger cities to hunt male deer for their antlers, cause problems in the male-female balance among populations. Team Member 3 in the IH explains: "*There are big problems with hunting because there is no real management. All the hunting concessions should have a hunting management plan but the reality is that they don't have. We are losing trophies, we have problems [with] male-female densities. We don't know exactly which densities we have because each hunting concession does its own counting.*" In addition, many hunters do not respect rules and protocols and shoot what they like. An eco-entrepreneur and sustainable hunter in the GCV bluntly states: *"Most hunters respect nothing"*.

Three rewilding interventions presented in the table above particularly focus on collaboration with hunters. First, the creation of no-take zones in the GCV, where agreements are made between hunters and Rewilding Portugal to stop hunting in certain areas that are most important for reproduction. This has a shared benefit for the hunters because it leads to an increase in wildlife populations including their favorite prey such as

rabbit, hare, partridge, and red deer. As Team Member 1 of the GCV explains: *"There is a point with the hunters in which we work in the same direction. Because we all want wildlife, in big numbers and then in the opposite direction [...] because they want to kill them and we want to keep them"*.

A second approach in the GCV is the creation of stewardship agreements, by which the hunters collaborate with Rewilding Portugal and allow certain natural processes to return to their hunting grounds such as the establishment of natural grasslands or the digging of water ponds for wildlife. Third, the GCV is introducing non-lead ammunition trials for hunters with the aim to prevent this extremely harmful substance from entering the environment.

In the IH, the relationships with hunters and the interventions to mitigate the negative impact of hunters, are still in an earlier stage. Rewilding Spain is setting up its first meetings with the hunting community. For example, the organization participated in a public tender to obtain hunting rights in a specific area of the IH to better control hunting there. However, they were outbid by a hunting association. Furthermore, the search for mutual goals will be leading the approach, as illustrated by an interaction of the Rewilding Spain team with the hunting community, by Team Member 1 of the IH: *"[...] we know that there is no rabbit in the area anymore, so we should also try to bring [back] the rabbit that may be positive for [the hunters]. So we look at different angles, but with these hunters it's difficult"*.

These efforts have led the conversations and relationships with the hunters in the GCV to have progressed and some hunters and hunting associations are starting to collaborate with Rewilding Portugal and understanding the mutual benefits for rewilding. The effects can already be seen in the rewilding areas, where the herd managers and the field workers in both the IH and the GCV have noted that wildlife is less afraid and roams more freely in the zones where hunting is not taking place. This could mean that wildlife is more likely to settle or migrate in these areas, which is positive for the dispersion of the populations.

III: Public authorities

Strong relationships with public authorities are key to the success of rewilding interventions on the Iberian Peninsula. As rewilding touches upon different domains, multiple public organizations are needed to make the rewilding interventions successful. As both landscapes span large areas (1.200 km² in the GCV and 8.500 km² in the IH), the landscapes span multiple jurisdictions and levels of government. This requires a lot of coordination and collaboration with different levels of government, as each layer (local, regional, provincial, national, European) will have its own mandate and politics. For example, in Spain all land is owned publicly and all grazing and hunting land goes to tender every 5 years by the autonomous regions. However, the day-to-day management of the areas is the responsibility of the municipalities. Therefore, rewilding requires collaboration on various levels of government. As Team Member 1 of the IH explains: *"At the lower level we have municipalities, but then we have the provincial government. [...] in this case, we are dealing with three different provinces, Guadalajara and Cuenca, inside Castilla de la Mancha region, [...] and Teruel in the Aragón region. So we have a mix of different governments and entities which makes it more complicated. We have four levels, municipal, provincial, regional, and national. These are the four levels of complexity. And each of them has a role in different moments and different projects. For example, the land where we have the horses in Solanillos [...] is from the deputación, which is a provincial government, Guadalajara. But they are only the owners, so when they launch the tender, we applied for them. But the moment that you need to manage and do things in that land, that's the regional government. So it's very complex."*

The effectiveness of collaborations with the different levels of government strongly depends on relationships between the governments and the rewilding team members. As explained by Team Member 1 of the IH: *"So you need to [ensure that] people [are] happy at all levels [of*

government] because if you have a good relationship with the municipality but not a good relationship with the regional government, [it can be a problem] for other activities [...]. There's a lot of diplomacy and talking and making them feel included in the initiative." Team Member 4 of the GCV describes his point of view: *"The connection with the government, with the municipalities, it's not easy. Working with politicians is not easy at all."*

Furthermore, governments change when there are elections, explains team member 1 of the IH: *"Everything can change from one day to another and you don't know if that's going to affect your grazing rights when they have to be renewed. If the new government has a different view, there will always be uncertainty about what's going to happen."*

Regarding specific issues such as reintroductions, reliable relationships with the protected area authorities are key. This is illustrated by the comment of Team Member 1 of the IH: *"[the Alto Tajo natural park director] is a key stakeholder and he's a very important part of the initiative. Without him, we wouldn't be here today probably."* The GCV is experiencing something very different in its collaborations with the protected area authorities. "*One of the most difficult things that we are finding, one of the biggest limitations we have here is the lack of collaboration with the authorities to introduce [wildlife]"*, says Team Member 1 of the GCV.

IV: Eco-tourism businesses

For eco-tourism initiatives such as bed and breakfasts, natural guides and nature experience leaders, and wild product owners, rewilding has brought mainly benefits. These benefits can be direct, for example in the form of an increase in revenue due to additional sales through the channels of the Rewilding teams or indirect, because the rewilding movement has created an additional influx of eco-tourists. The rewilding teams have a strong emphasis on creating new economic activity for these areas that are currently suffering from various economic issues. As Team Member 3 of the GCV explains: *"The online store is more for marketing, the window for the world to get to know the brand. But actually the rewilding center, every time a group of tourists comes with one of the guides, stop there, have two or three homemade beers and buy a T-shirt and buy some nuts and buy olive oil. [This way] we support [the businesses] directly not only by advertising the brands but helping it directly [with sales]."* He also adds: *"Since I was a kid here, there is much more tourism now, mainly foreigners, but not big tourism yet. The problem here is that most of the people pass by here, just [stay] one night and they don't really have the time to enjoy and we don't have the time to show all the things we have to show [...]. So the thing we will need to catch is the tourism that already knows that they are coming here. Booking a 3-4 nights trip here".*

A similar view is echoed by Team Member 3 of the IH: "*So in ecotourism, what we are trying to implement is [...] kind of a brand in the area that could be helpful to increase the quantity of tourists [...]. The quantity of income and revenue that local and private owners are [generating], but also the quantity of local owners and initiatives that can be created. We want to focus [strongly] on tourism based on natural resources. So we don't want to bring here any kind of tourist. We want to bring here tourists that are delightful with nature and with the natural resources that we have".* He later adds: *"We want to help the management but also help some private initiatives that can make a profit of the use of all these non-timber forest products, resin or mushrooms or aromatic plants."*

From the perspective of eco-tourism entrepreneurs themselves, the impact of rewilding activities on their business is illustrated by a nature guide in the GCV: *"Some customers come to visit the Côa Valley because of rewilding [...], they have an interest in the subject and they want to see it in local: how are things being developed and what it means."* he then adds: *"In the medium to long term, of course it will also benefit my activities because [...] these [rewilding] interventions are promoting the return of some wildlife. Specific wildlife that could be very interesting for nature or wildlife watching [...]."*

What seems apparent, is that in the GCV more eco-tourism businesses are working with the rewilding team than in the IH. This is likely due to the short time of operation of the team in Spain (8 months at the time of interviews), and because the GCV has focused on building a strong network of partners, the Wild Côa Network. Team member 4 of the GCV explains the development of the membership base of the Wild Côa Network: "So before it had to be rewilding Portugal looking for them, and sometimes was not easy even to convince them to enter, or the benefits they could have. Now it's completely the opposite. Now we receive quite a lot of messages even through social media of people that want to be members"

The IH team mentions that the Wild Côa Network is a good example for them too and Team Member 1 of the IH elaborates on the motivation for creating a network structure: *"We are also helping some of them to get organized and create an association of eco-tourist companies so that they can start creating synergies between them because the problem is that this is a huge area with more than 850.000 ha. Not all of them know each other, they don't know what everybody is doing."*

V: Local Communities & Education

Both the IH and GCV have been making efforts to involve the local communities in the rewilding narrative. Rewilding has been translated to the national language in Spain: *'renaturalización'*, making the concept more relatable for local communities. Furthermore, both teams are investing in events, fairs, social media, and other activities to involve the community in the project. Both areas are in different stages regarding community involvement. Team Member 3 of the IH explains their current focus is on involving early adopters: *"One of the main things [that] I'm clear about now is that we have to work with the early adopters. We are not trying to convince everyone [...]."* However, the IH team aim to spread the rewilding message among the wider public too, as Team Member 2 explains: *"We did a few meetings here for the community, for them to understand rewilding. We invited all the [...] general public but also all the other authorities".*

In the GCV, the process of community involvement is more developed. Since the beginning, the team has had a strong commitment to involve the local communities and be embedded in the social structure of the region. However initially, the team often encountered skeptical responses from community members. Team Member 4 of the GCV explains how the skepticism among the community has grown regarding nature conservation projects: *"The main projects we know in Portugal of nature conservation, is the LIFE project that starts and ends after four years and after the four years, they don't [maintain] a connection with the local community they were working with. After that, the money stops entering. They are not self-sustainable. And the work stops because it was just a question of money and projects."* Team member 2 of the GCV explains how the rewilding team in the GCV is different: *"We've always betted on having close relationships with people, developing those close relationships, working closely with the local communities and trying to involve them as much as possible in our work. We have people from the team that are from here. A lot of our partners are from here, so we try and create and embed ourselves [...] in this region, and be part of it rather than [being] outsiders that come in and do things."*

The involvement of the rewilding teams has also resulted in a strong connection to education. In the GCV, a platform for science and education is connected to the rewilding team. In the IH, it is a high school doing projects with the rewilding team. Students are enabled to engage in multidisciplinary projects with rewilding and are able to engage with the topic.

4. Outcomes

The main outcomes of these *I* (see Figure 2) can be summarized as;

(1) **New networks**, facilitated by rewilding entities functioning as a connector by establishing new collaborations. This is mainly illustrated by the GCV case, where

the multidisciplinary Wild Côa Network, a regional network consisting of mainly eco-tourism suppliers, has developed into a fruitful and active network benefitting tourism and economic activity.

(2) **Regional identity,** by local communities, public authorities, and businesses embracing the rewilding vision, a new regional identity as a rewilding area can emerge and contribute to existing narratives. This is a result from the rewilding team members interacting with key *A* by spreading the rewilding vision. This is done through online and offline channels and by actively involving the *A* that vision by organizing events, meetings, and social media.

(3) **Economic impact,** rewilding can lead to new economic opportunities. This is mainly illustrated by the GCV case**,** the development of business propositions in the region around rewilding and the visibility of those business propositions, has led to an increased interest in eco-tourism, businesses, and media, boosting the economic potential of the region.

(4) **Policy changes,** the continued efforts of the rewilding teams to influence policymakers at local, regional, national, and international levels to embrace rewilding principles, can lead to changes in policy and regulations that favor rewilding. This has been illustrated by small examples from both cases, where local governments have in some cases opened up towards the rewilding vision, but much can still be gained here.

(5) **Ecological impact,** the main aim of rewilding is of course restoring natural dynamics in the rewilding areas. Measuring the ecological impact of the rewilding interventions was out of the scope of this thesis. However, the ecological impacts have been discussed with key informants and include the return of keystone species and emblematic species, restoring trophic chains, improving the hydrological conditions, creating wildlife corridors, and decreasing wildfire occurrences and intensity.

DISCUSSION & LIMITATIONS

Two main findings can be distilled from this actor-centric SES analysis.

1. Collaborative actors are key

The results demonstrate that **collaborative actors** (*A*) are key to rewilding success. Firstly, this is illustrated by the collaboration of rewilding teams with public authorities. Even though the rewilding team in the IH has been in operation for a shorter period than the team in the GCV, their strong relationships with key public authorities have resulted in rapid progress in implementing ecological interventions. The preparatory phase of the IH team was focused on building relationships with public authorities and one of their key ambassadors, director of a natural park in the region, supports the IH team to successfully realize ecological interventions. In the GCV however, relationships with the protected area authorities have been slow, leading to a slowdown of certain ecological interventions in those areas.

Secondly, interactions of rewilding teams with farmers and hunters have proven key in successfully implementing ecological interventions. The GCV team has put in strong efforts over the past years to engage with these landowners, convince them of the rewilding principles, and involve them in rewilding interventions. Even though these actor groups have shown reluctance in collaborating, the GCV team has started to reverse the trend and a noticeable amount of livestock breeders, hunters, and other landowners are collaborating with them on implementing rewilding practices on their lands. A key success factor seems to be the realization of win-win situations, in order to convince these actor groups. In the IH on the other hand, the interactions with farmers and hunters are still marginal. This seems to be hindering their access to implementing rewilding interventions at a larger scale since there is a need to collaborate more closely with these actor groups as important stakeholders.

2. Rewilding is a long term process

A second key finding is that rewilding is a landscape approach that needs **sufficient time** to develop into its full potential. The development of local networks of community members and eco-tourism businesses is an illustration of this phenomenon. As the two rewilding landscapes of this thesis are sparsely populated, it takes time to identify, reach, involve, and commit community members and eco-tourism businesses to collaborate in a rewilding network. The organization of events, social media campaigns, and in-person visits to network members all contribute to realizing a strong network and support for the rewilding movement. In the GCV, the rewilding community has moved from being a rather small group without much interest from businesses, community members, and tourists, to a key network for the GCV area with an active membership, strong media presence, and attracting tourists from across Europe to the GCV. In the IH, such a network is under development – the first activities to engage members have been established and gradually community members and local businesses are getting involved with the rewilding team and their activities.

3. Reflection on the literature

These findings demonstrate the importance of involving key actor groups in the restoration of ecosystems to reduce barriers for ecological restoration, as argued by interviewees from this thesis and by previous researchers (Ban et al., 2013; Cortina-Segarra et al., 2021). The rewilding teams in the GCV and the IH implement this by take on a coordinating role in their landscapes, aiming to improve the understanding between different *A* and align their interests. Additionally, furthering political involvement in the rewilding landscapes and facilitating knowledge sharing are part of the rewilding management plans for both areas. These interventions are crucial when it comes to decreasing the existing barriers to ecological restoration (Cortina-Segarra et al., 2021) and are thus relevant components of the rewilding projects.

The results of this thesis demonstrate the viability of rewilding abandoned farmland in Europe as a preferred environmental solution over other land uses such as tree planting (Wang et al., 2023). It does not seem as if rewilding in practice encounters problems related to a lack of a generally accepted definition among scientists. The operational definition as defined by Rewilding Europe and mentioned in the introduction of this thesis appears to provide sufficient focus to make a systemic rewilding management plan and to start implementation. However, the lack of a shared definition does hamper the adoption of rewilding by governments and decreases comparability between landscapes, hampering the learning curve for rewilding in practice. The approaches in the GCV and the IH aims to include rather than exclude other landscape stakeholders in the rewilding process, which particularly makes these landscapes strong cases on stakeholder involvement and the landscape approach (Arts et al., 2017; Ban et al., 2013; Fischer et al., 2021). However, the potential of silent conflicts between rewilding and landscape stakeholders should be kept in mind when observing current successes of rewilding practices (Pellis, 2019).

4. Limitations

These two rewilding cases provide an interesting insight into a systemic rewilding program in practice. However they may not be representative of all rewilding projects on the Iberian Peninsula. Others are operating in the region too and are managed by different organizations that may adhere to different definitions, priorities and management plans related to the implementation of rewilding. This is a limitation of this thesis' generalizability.

A second limitation of this thesis is the potential for stakeholder bias on rewilding. A majority of stakeholders that were interviewed for this thesis were identified because they had an existing connection to rewilding in the landscape, either from participating in the rewilding networks in the GCV or the IH or from being part of the rewilding teams. This has most

probably led to a positive bias towards rewilding among the stakeholders that were interviewed.

CONCLUSION & RECOMENDATIONS

This thesis aims to answer the research question: **'How do rewilding interventions interact with key stakeholders in rewilding landscapes on the Iberian Peninsula?'** It aims to provide an insight into the interactions between rewilding and key stakeholders in rewilding landscapes on the Iberian Peninsula by taking a Social Ecological Systems (SES) perspective.

This thesis is building on existing literature on ecological restoration, landscape approach, social-ecological systems, and rewilding. The main data sources are existing literature, rewilding management plans, and the results of 23 semi-structured interviews with key landscape stakeholders across two rewilding cases on the Iberian Peninsula.

It also aims to improve understanding of the impacts of rewilding interventions on different stakeholders to better manage rewilding interventions in practice. The thesis uncovers the interactions for five key stakeholder groups: agriculture, hunting, public authorities, eco-tourism, and local communities & education.

The key interactions of the SES of rewilding landscapes on the Iberian Peninsula are: (1) conflicts, (2) new collaborations, (3) changes in ecological interactions, (4) changing opinions about rewilding. These interactions lead to outcomes: (1) new networks, (2) regional identity, (3) economic impact, (4) policy changes, and (5) ecological improvements.

The main practical contribution of this thesis is the identification of the types of *I* and *O* that can be expected in a rewilding landscape. These findings can be used by rewilding organizations when creating their rewilding management plan, both on the Iberian Peninsula and beyond. The findings of this thesis can provide support on the preferred timing, scope, and relevance of rewilding interventions.

Based on the findings of this thesis, rewilding organizations on the Iberian Peninsula are recommended to focus on the needs of each key Actor (*A*) group in their landscape and aim to find win-win solutions to progress rewilding in the landscape and prevent conflicts with *A*. This should be started early to increase the chances of collaboration. Social interventions are able to provide support for ecological interventions.

The main theoretical contribution of this thesis derives from it being the first research in which the Social Ecological Systems Framework (SESF) is applied to a rewilding landscape, to the knowledge of the researcher. The SESF has proven to be a useful framework for analyzing rewilding landscapes from a SES perspective. The SESF allowed for a visual representation of of the rewilding cases' SES and an improved understanding of the relationships between resource systems, resource units, governance systems, actors, and the rewilding interventions and the subsequent outcomes of these interventions. The SESF seems applicable to analyzing rewilding landscapes and is recommended for future research on rewilding landscapes.

A recommendation for applying the SESF to rewilding cases would be to reserve more time to focus on the in-depth interventions (*I*) and Outcomes (*O*) to better demonstrate which rewilding interventions create the most relevant *O*. If time and budget allow, a quantification of the *O* would be useful to strengthen the findings.

It would furthermore be useful to build on this thesis by studying rewilding with the SESF in a European context. This would allow for the inclusion of cases with more variability in social and ecological characteristics and could result in new insights into the interactions of rewilding with landscape stakeholders. This would contribute to progressing rewilding on a European level, potentially supporting EU policy recommendations. Especially, it would be useful to study the interactions over time for a set of

rewilding cases, allowing for a more detailed assessment of the time aspect of rewilding interventions.

Lastly, it would be useful to include more opponents of rewilding in the interviews, including hunters, farmers, and government officials, to capture their perspective and provide a complete picture of the interactions.

Rewilding remains a promising landscape approach for ecological restoration. Despite its criticisms and lack of a generally accepted definition, the analysis of these two rewilding cases confirms the potential for the rewilding approach to solve complex problems with a multitude of stakeholders through a strong combination of both social and ecological interventions.

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Appendix I: Interview Participants

Greater Côa Valley

Key Informants
Team member 1 Rewilding Team
Team member 2 Rewilding Team
Team member 3 Rewilding Team
Team member 4 Rewilding Team
Social Scientist
Geologist & Archaeologist
Landscape Stakeholder (category)
Cattle Farmer
Sheep Farmer
Nature Guide
Eco-tourism business (1)
Hunter
Eco-tourism business (2)
Wild food brand
Educational representative

Iberian Highlands

Key Informants
Team member 1 Rewilding Team
Team member 2 Rewilding Team
Team member 3 Rewilding Team
Team member 4 Rewilding Team
Professor in Ecosystem Restoration & Rewilding
Landscape Stakeholder (category)
Government representative
Nature management authority
Educational representative
Nature guide
Eco-tourism business
Farmers representative

Appendix II: Interview Protocols (English Versions)

A: Key Informants Protocol

1. **What is your role in the rewilding team and can you give a description of what your days look like?**
2. **What specific rewilding interventions have you been working on?**
3. **What have been the main aims of these specific interventions?**
4. **How has progress been so far on implementing these interventions?**
5. **Which stakeholders in the rewilding landscape are impacted (negatively or positively) by the interventions? How are they impacted?**
6. **Can you name some successes and some barriers to implementing rewilding in the landscape?**
7. **What do you think should be improved to reach the objectives sooner?**

B: Landscape Stakeholders Protocol

1. **How are you related to this landscape?**
   Discuss personal and professional activities of interviewee in the landscape
2. **Are you aware of the rewilding activities in this landscape?**
   Discuss most relevant rewilding interventions with interviewee
3. **Do these rewilding activities impact you in any way?**
   Discuss interactions between interviewee activities and the rewilding interventions.
4. **How could rewilding interventions support you better?**
   Discuss how rewilding organization could support the interviewee better

Appendix III: Informed Consent Template

Research Study Title: The broader impact of rewilding on a landscape level
Researcher Name: Eli Prins (Master student Forest & Nature Conservation)
Supervisors Name (if applicable): Sabrina Dressel (assistant professor)

Description of the study
You are being asked to take part in a study. This is a study about the impact of rewilding on a landscape scale, meaning how a variety of rewilding interventions impacts different stakeholders in and around the rewilding area.

You are being asked to participate because you are one of the landscape stakeholders, namely you are a:

_____

You are asked to participate in an interview. It will take about 30-60 minutes to complete. Before signing, please read this form and ask any questions.

Risks and Benefits of Being in the Study

This study poses little risk to you. You may stop participating and answering the questions at any time. There are no direct benefits to you from taking part in the study. Your input will be important to research projects and publications by improving our knowledge on the impact of rewilding interventions in European landscapes. Your input is important to these discussions. The results from my research project will be shared with you and the other participants. It will be shared via e-mail.

Confidentiality

- The data derived from this study may be used in education, student projects, but you will not personally be identified without your consent.
- We will record audio, for which we ask your permission below

Voluntary Nature of the Study

We thank you very much for your participation. Your decision to participate is completely voluntary. You may choose not to answer any part of the study or stop taking part at any time without any penalty to you.

Right to Erasure:

I understand that I am entitled to have the abovementioned information destroyed at my request, both during the research and while in storage, in line with the GDPR's right to erasure provision.

Contacts and Questions

If you have any questions, concerns please contact the researcher, Eli Prins, at eli.prins@wur.nl If you have additional questions regarding your rights as a research participant, please contact the Wageningen University and Research Scientific Integrity Committee at cwi@wur.nl .

_____ Yes, I would like to take part in the research.

_____ No, I would not like to participate in the research.

Recording Permission

I have been told that audio may be taken during my participation but that these recordings **are not for publication in any format**. I have been informed that I can ask that the recording be turned off at any time.

I agree to be audio taped under the above stated conditions.

Yes / No

Please write your name:

_____

Date:

_____

Signature:

_____