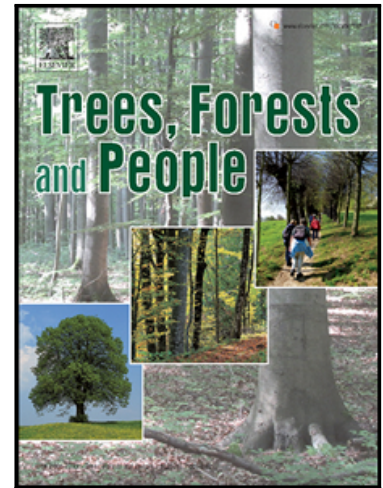


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Challenges for community-owned forests between traditional and new uses of forests: a Q-methodology study applied to an Alpine case

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Title page**Title:**

Challenges for community-owned forests between traditional and new uses of forests: a Q-methodology study applied to an Alpine case

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Abstract

There is a worldwide increasing interest in forest ecosystem services (FESs), especially regulating and cultural ones. Providing FESs requires the shift towards a multifunctional forest management approach, and forest owners are key in this process. Current research on motivations and attitudes of forest owners towards provision of regulating and cultural FES focuses on non-industrial private forest owners but neglects community-owned forests, despite them being often innovative and multifunctional models of forest resource management. The paper explores the views of community-owned forest institutions to provide forest recreation. Sixteen cases have been studied in an alpine valley in Italy, where these institutions have been existing since hundreds of years. Q methodology was used. Q methodology is a semi-qualitative technique used to systematically analyze diverse points of view among individuals or groups by having them rank statements on a topic, allowing for the identification of similar views. Results show a general positive view of community-owned forest institutions towards providing recreation but with nuanced positions, which could be clustered in two groups. The first and largest group looked favourably at providing more forest recreation; the change towards forest recreation was however conditional to maintain adequate levels of income and receiving external support from public authorities. The latter and smaller group was more sceptical, being concerned about the potential negative impacts of visitors in the forest. Both groups stressed that sensitivity and respect of the visitors towards the property are decisive factors for accepting and improving public accessibility. The paper reflects on the challenges for these traditional forms of forest ownership in front of new societal demands, and concludes that, regarding forest recreation, the attitudes of community-owned forest institutions are not very different than those of other private forest owners.

Keywords: *Non-Industrial Forest Owners, NIPFs, Forest commons, Common pool resources, collective action, Forest Ecosystem Services*

Introduction

In recent decades, the need for a larger and more diverse provision of ecosystem services from forests, i.e., Forest Ecosystem Services (FESs), has come to the forefront in the forestry arena. Research and practice have provided evidence that society demands more FESs with a public good dimension, especially climate mitigation and adaptation, habitat and biodiversity conservation, recreation and wellness, landscape, and amenity (Winkel et al., 2022). This changed demand implies a shift from traditional forest management practices more focused on provisional FESs, like timber or fuelwood, towards new multifunctional management approaches, capable of producing non-provisional services, i.e., regulating and cultural FESs. Forest owners are at the core of this change, as they make decisions on which management practices to adopt and consequently, this affects the types and quantities of FESs provided by their forest (Bergstén et al., 2018; Gatto and Bogataj, 2015; Pukkala, 2016). However, while public-owned forests are purposely designated to provide public services, responding to societal demand for FESs is a challenge for non-public forest owners. Not only is multifunctional forest management more complex, but often providing regulating and cultural services conflicts with goals of supplying timber or fuelwood (Eggers et al., 2018; King et al., 2015; Zoderer et al., 2016). Hence, forest owners must deal with trade-offs (Kennedy et al., 1996; Urquhart et al., 2012), income losses, and transaction costs (Weiss et al., 2007). In order to internalise public values and meet the societal demand for regulating and cultural FESs, policy actions and financial support are then required (Blanco et al., 2015; Danley et al., 2021; Harshaw and Sheppard, 2013; Mann et al., 2010; Winkel et al., 2022).

A relevant strand of research on the development of effective economic instruments has focused on the motivations and attitudes of forest owners to participate in programmes aimed at supporting the provision of different FESs. Indeed, only through appropriate targeting and tailoring of policies is it possible to reach adequate levels of FESs to fulfil societal needs. This

literature (Bergstén et al., 2018; Häyrynen et al., 2017; Joshi and Arano, 2009; Matilainen et al., 2023; Rizzo et al., 2019) usually concentrates on Non-Industrial Private Forest Owners (NIPFs) which dominate the scene of forest ownership in several European and Northern American countries (Hirsch and Schmithüsen, 2010; USDA, 2012). NIPFs have been shown to have widely different motivations for forest management, that go well beyond profit maximisation (Gatto et al., 2019; Westin et al., 2017) and include personal and family beliefs, bequest values (Boxall, 2000; McFarlane and Hunt, 2006; Stenner and Watts, 2012), enjoyment of recreation and amenity, biodiversity conservation (Sorice et al., 2014), consultants' actions (Deuffic et al., 2018), and knowledge and access to information (Bjärstig and Kvastegård, 2016). All of these motivations, beliefs, and intentions contribute to the provision of FESs for both owners and the public at large and can be successfully used to leverage forest owners' participation in policies. However, the NIPF literature on motivations to engage in provision of FESs to the public does not fully cover the entire spectrum of forest tenure types, which also includes community forests. Community forests are widely diffused across several areas of the world (Ficko et al., 2019; Lawrence et al., 2021; Ostrom, 1990), albeit under different institutional forms, and often display high environmental, biodiversity, landscape, and recreational values. Therefore, they may be relevant for the provision of FES (Guadilla-Sáez et al., 2019; Short, 2008). In addition, community forests have emerged in many parts as an innovative model of natural resource governance, capable of implementing innovative solutions, to help transition toward climate-smart forestry and to provide a broad range of regulating and cultural FESs (Girolami et al., 2023; Hovis et al., 2022; Louda et al., 2023; Thammanu et al., 2021; Vorbach and Ensor, 2022). Community-ownership of forests has a long history in the Alps, specifically in Switzerland (Netting, 1976), France (Zanjani et al., 2023), Italy (Favero et al., 2016), Slovenia (Bogataj and Krč, 2014) and Austria (van Gils et al., 2014), where have existed for several centuries: hence, they are considered models of robustness and adaptation (Haller et al., 2021; Ostrom, 1990). Common ownership and a multifunctional land management approach based on sustainability

and solidarity rules (Merlo et al., 1989) allowed these communities to persist over time despite several shocks (famine, pests, wars) and natural disturbances (Casari, 2007). Community-owned forests and pastures regularly provided not only timber and fuelwood, but also several non-provisional FESs like protection against natural hazards (Moos et al., 2023), biodiversity and environmental stewardship, food security, and local ecological knowledge. Monetary income sourced from the sale of timber and dairy products was also used to cover community needs, such as schooling, education and social welfare (Baur and Binder, 2013; Merlo et al., 1989). This historical attitude of providing FESs to a community makes Alpine community-owned forests an interesting, and still rather unexplored, case in studying to what extent this form of land tenure and management can contribute to the demand for provision of FESs to society. This is even more relevant today, given the increased connectivity between mountainous valleys and lowland urbanised areas (Brondizio et al., 2009; Cox, 2014), which makes community-owned forests more accessible to recreationists.

With this in mind, this paper aims to explore the perspective of the owners in cases of community-owned forests on the opportunity to reorient their forest management towards providing more non-provisional FESs. The cases presented under study are the *Regole* (sing. *Regola*), which are examples of institutions in the northeastern Italian Alps where land is commonly owned, i.e. undivided, by the members of the local community (Favero et al., 2016; Gatto and Bogataj, 2015). For each *Regola*, the community is identified by a roll of family names and membership is based on family lineage. The governance system of the *Regole* is based on customary written rules (*Laudi*) which foreseen the democratic election of its deputies and president (see e.g. Pieraccini, (2013) for the *Regole d'Ampezzo*). In this paper, the sixteen *Regole* of the Valley of Comelico are studied (Figure 1).

The exploration of *Regole's* views is based on the Q methodology (Brown, 1993), a mixed qualitative-quantitative technique developed by psychologist William Stephenson (Brown, 1993)

and used to explore and analyse human preferences, beliefs, and viewpoints on specific topics (Robbins and Krueger, 2000).

This paper focuses on one specific FES, i.e., recreation enjoyed by the public in the community-owned forests. The choice of focusing on recreation is motivated by several different reasons: i) recreation is characterised by a fast-growing societal demand across Europe (Bell et al., 2007; Tyrväinen et al., 2021), especially in protected areas (Balmford et al., 2015), which are often managed, or advocated to be managed, by community-owned forests (Guadilla-Sáez et al., 2019; Kitamura and Clapp, 2013; Pieraccini, 2013); ii) compared to other non-provisional FESs, recreation can be more easily turned into a marketable service through the provision of forest-related activities (e.g. guided hikes, thematic visits, horse-riding, sports, forest bathing) and connected services (accommodation, food, bike-renting services of bikes and other equipment) (Mantau et al., 2001), thus representing a tangible and attractive income opportunity (Mäntymaa et al., 2021) that owners can more easily understand; iii) signs of attempts to introduce tourism-based activities in community-owned forests have already been detected in other areas of the Alps outside of Italy (Kissling-Näf et al., 2002), so it might also be interesting to investigate their potential in other less explored areas of the Alps; iv) research outcomes for NIPFs' motivations have shown that recreation is relevant for forest owners' own private use (Nordlund and Westin, 2010; Rizzo et al., 2019), while, when the public is concerned, recreation is generally perceived as a potential source of trespassing (Upton et al., 2012) and threat to the forest (Snyder and Butler, 2012); it is therefore interesting to analyse if the attitudes and views of common owners coincide with those of NIPFs or if they are more inclined towards meeting public demand for recreation, given their alleged concern with social and community aspects; v) although there is vast research on the motivations and perceptions of forest owners to engage in the provision of recreation, the literature on the provision of FESs from community-owned forests is still scarce (Gilmour and et al., 2016) and so far has mostly focused on biodiversity conservation (Guadilla-Sáez et al., 2019; Joa and Schraml, 2020).

In general, this research adds to the patchy knowledge of forest owners' perspectives in southern Europe and in particular in the Italian Alps, where research is still very scarce (Ficko et al., 2019; Gatto et al., 2019; Mozzato and Gatto, 2016). By taking into account that acting collectively improves the provision of FESs (Kittredge, 2005), the paper also considers willingness and attitudes toward cooperation amongst forest owners and with other stakeholders at a valley scale.

2. Materials and Methods

Study area

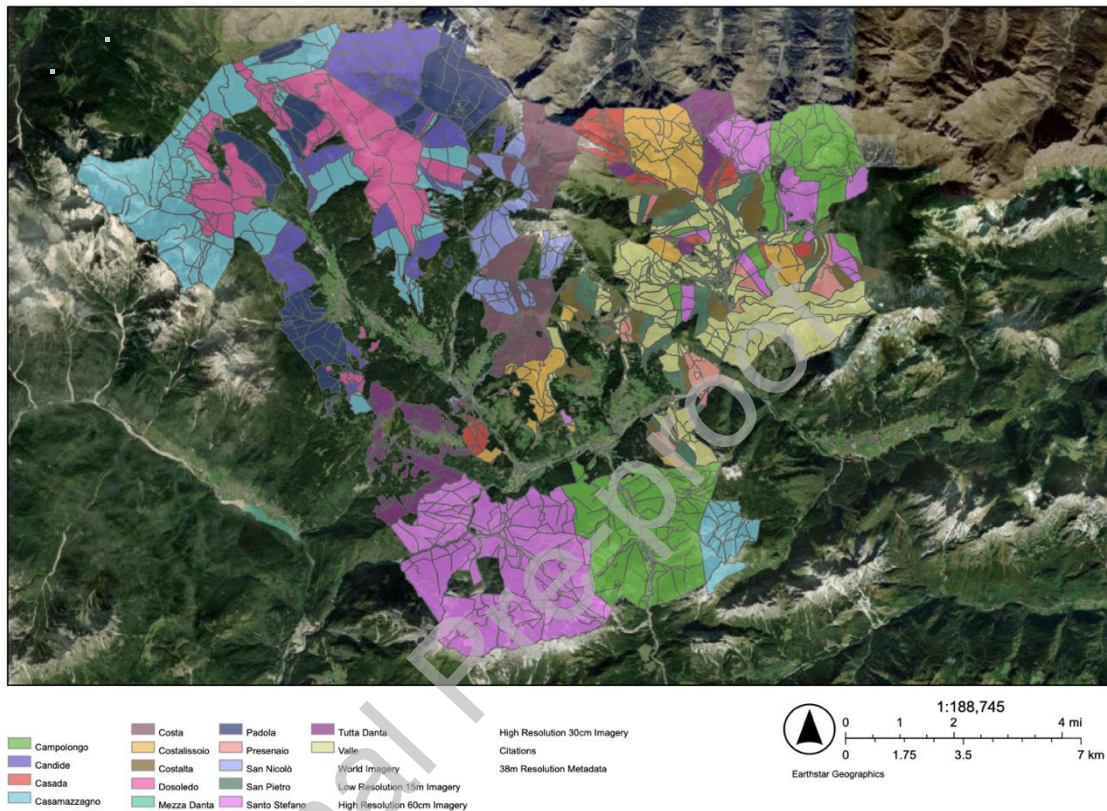
Comelico is part of the Dolomiti UNESCO Heritage site (<https://www.dolomitiunesco.info/en>) and well suited for nature-based tourism and outdoor recreation (Schirpke et al., 2018); however, it is less developed with respect to the other Dolomite valleys, such as Ampezzo or Cadore.

Differently from these other valleys, where other types of forest ownership are also relevant, in Comelico around 80% of the forest land is owned by communities. For more than a thousand years, each one of the sixteen *Regole* has owned on average 800 hectares of forests (and 380 hectares of pastures) (Canzan, 1999) (Fig. 1). Forest management is based on uneven-aged continuous-cover forestry with natural regeneration and selection cutting, to comply with the requirement of Italian forest law to keep soil covered for erosion prevention reasons. Timber and firewood are the main provisional FESs provided, while close to nature forest management provides conservation values. As in the largest majority of Italian forests, recreation is currently a public good, with free access on foot and it is difficult or costly to exclude recreationists.

Revenues from timber and other activities are partially reinvested for forest and pasture management and for maintenance of forest paths, roads, and buildings. These activities contributed to a well-maintained landscape, attractive for tourists. Like other Alpine valleys, Comelico is also subject to demographic changes, increased community heterogeneity, growing, and new demands for services, which inspires rural communities to search for new roles. This aligns with the provisions of the new National Law on community-owned land, which states that

the Regole are 'instruments of primary importance in the conservation and valorisation of the natural and cultural heritage of the country' (Act 168/2017 Art. 2, comma b).

Figure 1. Community-owned forests of the sixteen Regole of Comelico.
The colours identify the different Regole, while the grey lines the forest and pasture management parcels.
Source: V. Ferrario, IUAV University, 2024.



2.1 Q Methodology

Q methodology is a mixed qualitative-quantitative method increasingly used in recent times to analyse similar or divergent perceptions across different individuals or stakeholders groups (Dieteren et al., 2023; Grimsrud et al., 2020). In Q methodology, the different perspectives on which respondents are asked to express their view are represented through a number of statements (i.e., the 'Q-set') related to the specific topic being studied. Participants (i.e., the P-set) are then asked to sort such statements and rank them in a quasi-normal distribution according to

their views. Hence, in Q methodology the participants are the variables, while the statements are the observations (Stenner and Watts, 2012).

Compared to fully qualitative methods, a strength of Q methodology lies in it being more systematic, as it relies on a structured assessment where the subjective perspectives of individuals are inventoried, and groups of similar views are identified (Mahlalela et al., 2022). Another strength is that it does not require a large number of participants to generate meaningful statistical results (Stenner and Watts, 2012; Živojinović and Wolfslehner, 2015). These characteristics make Q methodology well suited for the purpose of this paper, that is exploratory in nature and focused on a relatively small number of community-owned forests whose viewpoints are of interest for the study. This methodological choice is supported also by the successful application of Q methodology in several other studies in the environmental and forest domains, with the aim to analyse the values and perceptions of different stakeholders (Newman and Ramlo, 2010; Sneegas et al., 2021). For example, it has been applied to assess perceptions and visions of Serbian urban stakeholders on climate change adaptation (Živojinović and Wolfslehner, 2015), of Indonesian stakeholders on payment schemes for forest watershed services (Jaung et al., 2016), of Mexican communities towards introducing forest management planning for recreation (Rodríguez-Piñeros and Mayett-Moreno, 2015), of European forest actors on the management of treeline areas (Nijnik et al., 2018), of Vietnamese forest commoners on what is needed to achieve sustainability in forest management (Nhem and Lee, 2019), of stakeholders on different ecosystem services of wetlands in Eswatini (Mahlalela et al., 2022).

In line with Nhem and Lee (2019), the Q-methodology study of this paper has been developed through a five-step procedure (Table 1):

Table 1: The outline of the five-step design of the Q methodology

Research Objective	To explore viewpoints of community-owned forests to manage forest for recreation
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Step 1: Develop the Q set	<ul style="list-style-type: none"> - Statements creation: Review of the concourse in scientific literature, semi-structured interviews with members of the local community to address local concourse specificity, personal experience in the study area - Selection of a sample of statements which cover the range of opinions in the concourse - Selection of Q statements for the final Q set
Step 2: Select the P-set	<ul style="list-style-type: none"> - The P-set is formed by the official representatives of each one of the sixteen Regole, with the aim to cover their different perspectives
Step 3: Administer the Q-set	<ul style="list-style-type: none"> - Respondents rank the Q set in the quasi-normal grid: the Q-sort - Additional auxiliary information is collected via commentary during the Q sorting process.
Step 4: Analyse the Q-sorts	<ul style="list-style-type: none"> - Criteria to retain factors: eigenvalues > 1, scree test, explained variance, and at least two significant loaders - Output used for interpretation: correlation matrix between all Q-sorts, factor loading scores, defining Q-sorts (factor array), z scores, communality, distinguishing Q statements - Consensus Q statements
Step 5: Interpret the factors	<ul style="list-style-type: none"> - The set of shared perspectives is analysed using the available data and the understanding of the researcher. - Labelling factors is a quick indicator of their perspective.

Source: Nhem and Lee (2019), adapted.

Step 1: Develop the Q set

The Q-set is a list of items representing the concourse, i.e., the issue/s under study. For ensuring the best coverage of the concourse, we developed the Q set in several steps. The literature on the topic of forest recreation was thoroughly reviewed as the starting point and a tentative list of more than one hundred provisional statements was developed. Then, five local experts were interviewed in order to identify further statements that could improve the representation of all the potential opinions on the topic of forest recreation in Comelico. This large number of statements was organised in six sub-themes that emerged during the statement creation describing the various aspects of the overarching theme of forest recreation by the public in the community-owned forests:

- i) forest management measures and issues related to recreation;
- ii) awareness of the importance of recreation for the public and of demand trends;
- iii) attitude towards recreation in forests;
- iv) forest recreation as a source of income (economic perspective);
- v) forest recreation as a threat to forest conservation (environmental perspective);

- vi) attitude and perceived importance of cooperation among the Regole in the management of forest for recreation. This was intended as a possible range of coordinated initiatives, such as developing common forest recreation management plans or offering a specific forest recreation service.

As a third step, a refinement and reduction of the overly large number of statements to arrive at the final version of the Q set was carried out, based on the following criteria:

- representation of each subtheme in a balanced way, i.e., with an equal number of statements;
- avoidance of duplicates - hence similar statements were merged;
- representation of each possible opinion by a negative, a neutral, and a positive statement, in order to cover the full range of viewpoints on each sub-theme in the discourse and to reach a balanced Q set. The missing statements were prepared by the authors by reversing the already available positive or negative statements according to what was missing;
- applicability in the study area, by avoiding statements that were too specific or too general to be addressed by the participants. This selection was carried out mostly by the first author of the paper, thanks to the personal experience accumulated in one year of full-time research residing in the study area.

The final version of the Q set resulted in fifty-four statements (Table 4). This is in line with the literature, which suggests a number proportional to the size of the P-set and ranging from 40 to 80 statements (Stenner and Watts, 2012). Each statement was written on a card, printed on white paper, of 7x5 cm size, to be easily read.

Step 2: Select the P-set

The P-set is represented by the group of persons whose opinions and viewpoints are under study. The design of Q methodology implies that the size of the P-set is not critical (Nhem and Lee, 2019; Stenner and Watts, 2012). The literature recommends that participants in the P-set

are selected purposely to represent the viewpoints connected to the research objectives, not to represent the population (Nhem and Lee, 2019). Following this principle, the P-Set of this study is formed by a representative for each one of the sixteen Regole of Comelico. In order to choose the most appropriate representative, we considered that each Regola has a government composed of five deputies elected by the assembly of members, who remain in office for five years and appoint, amongst them, a president and a vice-president. The president is therefore the official 'political' representative of the community, its spokesman and the person who, thanks to his/her role, is expected to have the most comprehensive and thorough perception of the viewpoints of the community¹. He/she is also the legal representative of the Regola. For these reasons, the presidents were chosen for the P-set. In cases where the presidents were not available to participate, the vice-presidents were interviewed. The final number of components of the P-set, out of sixteen Regole, was thirteen. Of the three missing Regole, two were not available for the interview, while the third shares the President with a larger Regola of the same municipality, therefore, these two Regole were considered as one for the purpose of the current study. The majority of respondents's age ranged between 50 and 60 years, with only two cases of younger presidents aged between 30 and 40; twelve of the presidents were men and only one was a woman².

Step 3: Administer the Q-set

Data collection in Comelico was carried out between January and March 2023. The Q sets were administered in person during meetings. Prior to the meeting, the privacy and consent forms were sent by email.

¹ It should also be considered that the role of the President is not salaried, only direct expenses are covered: hence, candidates usually cover the role of President out of moral obligations and social sensitivity rather than expectations of income or professional ambitions.

² Having a woman president is not a common occurrence, as many *Laudi* (customary written rules) of Italian community-owned forests do not grant women full rights and only recently, they started to revise their rules to include women representatives and in positions of power.

The general concourse was first introduced to the participants referring to a change in the management of Regole's forests towards a more multifunctional model, incentivising the access of recreationists. The suggested possibilities to encourage forest recreation ranged from simply providing increased signage and information to introducing more structured activities such as improving roads and trail networks or developing recreational infrastructures such as picnic areas.

A flat Quasi Normal Distribution table (Figure 2) was chosen for the Q-sort. A flat table is suggested by Stenner and Watts (2012) in case the P-set are experts or are supposed to be knowledgeable on the subject of inquiry. Similarly to other Q studies (Jaung et al. 2016; Nhem and Lee 2019), the cards had to be distributed by the P-set in a range of disagreement/agreement of -5, +5 from -5 (completely disagree) to -1 (slightly disagree), 0 (indifferent/don't know/don't have an opinion), +1 (slightly agree) to +5 (completely agree). Instructions for the P-set were that they should read first all the cards, then distribute them in three groups according to general feelings of agreement, disagreement, or indifference. After the three main groups were formed, participants were asked to fill the quasi-normal distribution by further distinguishing the strength of their agreement or disagreement with the statements. Before starting the sort of the Q set, participants were told that they could ask for clarifications or provide comments on their choices of distribution during the Q sorting operations. In case of difficulties to place the cards within the established borders of agreement, disagreement, and neutrality areas, participants were reassured that the author was taking notes about the real borders of agreement, disagreement, and uncertainty areas. With the written permission of the participants, the conversations during the Q-sorting process were recorded to improve the interpretation and analysis of the Q sorts. The members of the P-set took between half an hour and two and a half hours to do the Q sort. An example of a Q sort is reported in Figure 3.

At the end of the sorting, a short interview took place, with a few questions about the participant's personal data, i.e., the educational and professional background and the experience with forest management and tourism.

Figure 2. Q-sort matrix for 54 statements. The first row represents the agreement scale that goes from -5 (total disagreement) to +5 (total agreement). The red area identifies where disagreement statements are distributed, the yellow area identifies the space for neutral statements, and the green area identifies the area where the participants distribute the statements they agree with.

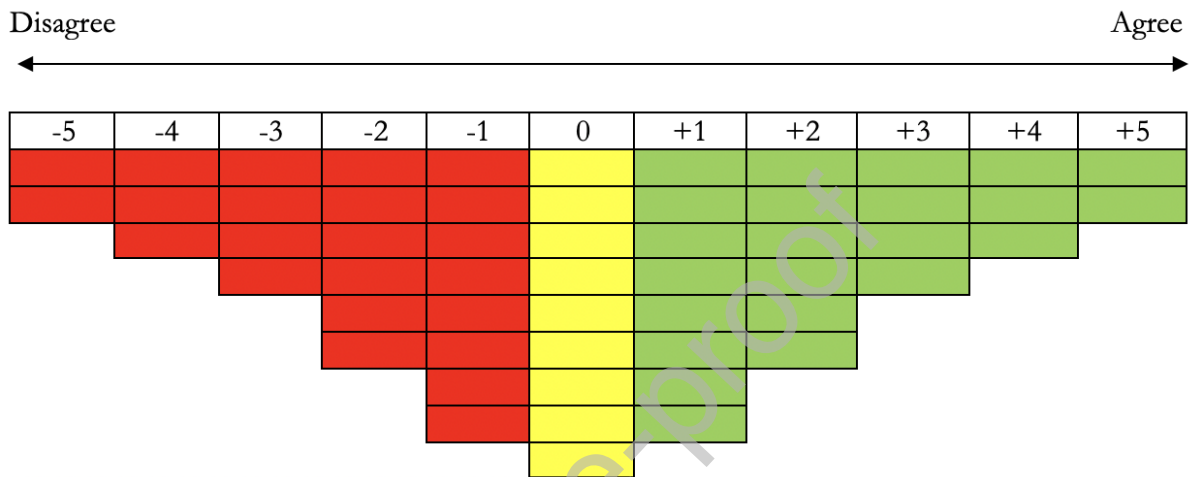
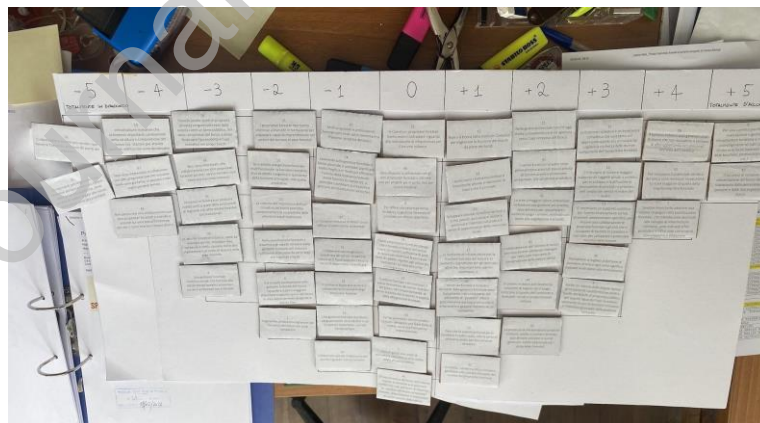


Figure 3. A Q sort by one participant.



Step 4: Analyse the Q sorts

Statistical analysis of the Q sorts is based on Factor Analysis or Principal Component Analysis (PCA) (Stenner and Watts, 2012). Q sorts were analysed with RStudio software (RStudio

2021.09.20, Build 351 “Ghost Orchid”) with the dedicated package ‘qmethod’ (version 1.8.4) (Zabala, 2014). The analysis was performed in two main steps.

The first step is data reduction with centroid factor analysis. Only factors that explain higher portions of the variance in the data are kept (Stenner and Watts, 2012). Factor rotation is a further step to improve the clarity of results interpretation. Rotation allows to focus on the extracted and chosen factors related to the collected data (Stenner and Watts, 2012). The rotation with the Varimax method was used due to its ability to identify the main points of view of the group of respondents (Stenner and Watts, 2012). Rotation results are a matrix of factor loadings, where Q sorts are rows and factors are columns, representing the relationships between Q sorts and factors (Zabala, 2014).

The second step is the flagging of the most representative Q sorts, which are the only ones used in the rotation and subsequent calculations (Zabala, 2014). Flagging is done by looking at the loading of each Q sort being significantly high (significance level $\alpha=0.05$) and that the ‘square loading for a factor j should be higher than the sum of the square loadings for all the other factors’ (Zabala, 2014). Respondents are related to factors in terms of similarity based on how high the loading of their Q sort to that factor is (Nhem and Lee, 2019). In this study, the main criterion used to choose the factors to keep was the explained variance, which is also used by Cools et al. (2009) and Schneider et al. (2015) and the threshold of the Eigenvalue >1 . Factors’ explained variance between 35-40% or above is considered a sound solution in Q methodology (Stenner and Watts, 2012, p. 105). Other studies reported similar or lower variances (Mahlalela et al., 2022; Nhem and Lee, 2019; Nijnik et al., 2018). A high factor loading indicates a high similarity to the factor. Factor loadings are chosen on the basis of their significance. Significance at $p\text{-value}=0.05$ of a factor loading is calculated with the following formula (1):

$$SE = 1,64 * \frac{1}{\sqrt{N}} \quad (1)$$

where SE is the significant factor loading and N is the number of Q sorts. In the current study, the threshold for significance of loadings was ± 0.35 . b^2 indicates *communality*, which is the

variance of each Q sort that has been accounted for by the factors that were extracted (Stenner and Watts 2012). High communality indicates that a Q sort is typical of a specific factor, while low communality signals the opposite (Stenner and Watts, 2012).

Step 5: Interpret the Factors

The literature on Q methodology does not provide a standardised procedure for factor interpretation (Stenner and Watts, 2012). A key principle when approaching factor interpretation is to keep the analysis holistic and not to focus on single items or statements (Stenner and Watts, 2012) to understand the whole viewpoint. In this current study we followed a procedure suggested by Stenner and Watts (2012), and also used by Howard et al. (2016), i.e., the crib sheets. Crib sheets are drafted and linked with demographics and post-interview information, as well as notes. The crib sheets contain factor arrays, which are 'single Q sorts configured to represent the viewpoint of a particular factor' (Stenner and Watts, 2012). The factor arrays are generated based on the size and rank of the z scores (Stenner and Watts, 2012). Z scores are indeed the base for factor interpretation (Zivojinović and Wolfslehner, 2015). The crib sheet is structured in four sections: the first section contains the +5 statements, the second section contains the statements that scored higher than the other factor, the third section contains the statements that scored lower than the other factor, while the final section displays the -5 statements. Interpretation of the Q sorts was supported by the comments provided by the participants about their distribution of the Q statements.

3. Results

3.1 Analytical results

Two factors were retained with eigenvalues of 3.25 and 1.71, accounting for 38.15% (25% and 13%, respectively, for Factors 1 and 2) of explained variance. Rotated factor loadings and the parameters of each factor are presented in Tables 2 and 3.

In Table 2, Factor loadings are shown for the two chosen factors, as measures of how much each Q-sort exemplifies a factor. Our results show that the communality of Q sorts is generally low.

Table 2: Factor matrix with Q sort and P-set factor loadings and communality (in percentage) calculated by square sum of each Q sort loadings in each factor. The Q-sort loadings that were flagged are in bold.

Q Sort	Factor 1 Loadings	Factor 2 Loadings	h ² %
S01	0.38	-0.41	0.09
S02	0.63	-0.32	9.61
S03	0.67	-0.20	22.1
S04	0.59	-0.36	5.3
S05	0.12	-0.46	11.56
S06	0.46	-0.27	3.61
S07	0.36	-0.55	3.61
S08	0.63	-0.08	30.25
S09	0.67	-0.18	24.01
S10	0.18	-0.46	7.84
S11	0.11	-0.47	12.96
S12	0.57	-0.29	7.84
S13	0.59	-0.35	5.76

Composite reliability and standard error of factor Z scores are used to evaluate the goodness of the selected factors in representing the most important viewpoints (Nhem and Lee, 2019) (Table 3). (Brown, 1993) explains how factors gain more reliability based on the number of Q sorts defining them, while also reducing their standard error of the factor scores.

Table 3: Factor Characteristics

Description	Factor 1	Factor 2
Eigenvalues	3.2	1.7
Total number of defining variables (Q sorts)	8	5
% of explanation of the variances	25	13
Average relative coefficient	0.8	0.8
Composite reliability	0.97	0.96
Standard error of factor z scores	0.17	0.22

Factor arrays (Table 4) allow cross-comparison between factors, which otherwise could not be compared due to different numbers of Q sorts defining them (Stenner and Watts, 2012). Total

factor scores have to be converted to z scores, which are then used to produce the Factor arrays (Stenner and Watts, 2012).

Table 4. Factor arrays and Z scores elaborated with the R package ‘qmethod’. Negative statements on the topic of forest management for recreation are highlighted in light red, neutral statements in light grey, and positive statements in light green. Factor arrays represent a synthesis of the two main viewpoints, with colours highlighting the agreement, disagreement, and neutrality for each statement.

Sub-theme	Statements	Factor Array 1	Z scores F1	Factor Array 2	Z score F2
MANAGEMENT ASPECTS BETWEEN TRADITION AND RECREATION	01. In general, timber production and forest recreation are competitive uses of forests.	-4	-1.69	0	-0.06
	02. In forest planning, recreation in forests is not adequately taken into account by local and regional institutions.	0	0.34	2	0.50
	03. Multifunctional forest management providing economic, social, and environmental benefits at the same time is not possible.	-4	-1.91	-4	-1.78
	04. Although the Regola forest has characteristics similar to public forests in terms of recreational potential, in the first place, recreation services are rarely the main objective of forest management.	1	0.53	3	1.08
	05. Forests managed with close-to-nature silviculture are also suitable for recreation.	0	0.42	0	0.08
	06. The main future change in forest management will be toward the designation of more specific areas for given ecosystem services.	0	0.15	2	0.82
	07. It would be important to have a strategic vision in forest planning, by identifying specific and distinguished areas for the development of recreation infrastructures, for timber production and for conservation and protection.	3	1.09	0	0.01
	08. To have a sound planning, realisation, and management of tourism infrastructures, it is necessary to involve all local stakeholders (tourism operators, forest companies, local administrators, etc.).	3	1.82	4	1.26
	09. Forest management must have specific measures for recreation in the forest.	4	1.31	2	0.61
AWARENESS OF RECREATION IMPORTANCE	10. By adopting multifunctional forest management, recreation is a complementary and spontaneous by-product of the main objective, timber production.	1	0.6	1	0.26
	11. There is today limited awareness or openness for forests for recreation within forest management.	2	0.82	-1	-0.31
	12. At present, not much has been done in Comelico to improve forest management for tourist recreation.	0	0.2	-2	-0.53
	13. The growth of recreation in forests could hamper the sustainability of traditional forest management.	-3	-1.28	0	0.05
	14. The forest sector does not recognise the economic value of forest recreational services or the demand for services that society expects from forest management.	0	0.3	-1	-0.21

	15. Forest recreation is a complex experience that will be more appreciated by understanding the various components of the forest ecosystem.	3	0.83	-1	-0.4
	16. More public and private actors need to support the development and spread of innovation in the field of forest recreational services.	1	0.53	-1	-0.4
	17. Demand for forest tourism infrastructure is growing, especially for more active sports (mountain-bike, adventure park, etc.).	2	0.68	4	1.97
	18. Forest and nature tourism can help to preserve the forest ecosystem.	-1	-0.26	-3	-1.25
ATTITUDE TO FOREST MANAGEMENT FOR RECREATION	19. Recreation infrastructures that require relevant changes in the structure and composition of the forest (buildings, sports infrastructure) are not desirable.	-2	-0.81	-2	-0.8
	20. Many forest owners and forest technicians are reluctant to increase the provision of recreational services from forests.	-1	-0.2	-2	-0.73
	21. Forest owners have no interest in investing in training to develop entrepreneurial skills for forest and nature-based tourism.	-2	-0.9	-3	-1
	22. Regole in Comelico have different visions about the creation of tourism infrastructures in the forest.	0	0.2	2	0.53
	23. Forest management that balances timber supply and recreation ecosystem services is important but not fundamental.	-1	-0.24	-2	-0.8
	24. Tourists are welcome in the forest as long as they understand and respect nature.	3	1.2	3	1.22
	25. Developing recreational activities in forests or pastures can also help preserve the cultural identity and sense of belonging of local communities.	4	1.23	1	0.35
	26. There should be more trails to facilitate visitors' access to the forest.	-2	-0.8	-5	-2.11
	27. Since the forest area in Comelico is quite extensive, it is worth using it for tourism and recreational purposes.	2	0.74	0	0.23
ECONOMIC PERSPECTIVE OF FOREST FOR RECREATION	28. Efforts to improve recreational use of forests are more feasible in public-owned forests, where income losses due to reduced utilisation are more acceptable.	-2	-1.02	-1	-0.4
	29. Forests (including those on private property) are perceived by society as a public good, but forest owners must pay for accessibility and recreational use in their own forests.	1	0.53	4	1.31
	30. Non-provisional services resulting from forest management are typically seen as part of the package of 'products' offered by the forest for free, without the owner and the manager receiving any compensation.	0	0.24	1	0.44
	31. As a forest owner, I believe that forest tourism cannot generate a sufficient number of jobs to become the main source of income compared to more traditional uses. I see it more as an income supplement.	-1	0.01	3	0.93

	32. On average, tourist-recreational services can generate only a small portion of income for forest owners.	-1	-0.1	1	0.38
	33. To turn forest tourist-recreational services into a real source of income, entrepreneurial training is necessary.	1	0.63	1	0.3
	34. Forest tourism can generate incomes approximately equal to those from timber production or other more traditional forest activities.	-3	-1.12	-3	-1.34
	35. The presence of recreational infrastructures in the forest, even in a limited number, can attract visitors and thus generate additional income for forest owners.	1	0.54	1	0.44
	36. Forest and nature-based tourism can create jobs that do not exclude or limit other employment opportunities in the Comelico area.	1	0.61	2	0.53
ENVIRONMENTAL PERSPECTIVE OF FOREST FOR RECREATION	37. Recreational use of the forest causes widespread environmental problems.	-3	-1.61	-1	-0.51
	38. Allowing thousands of people to access the forest each year entails the risk of causing significant damage to regeneration.	-1	0.1	5	2.4
	39. Recreational activities in the forest, such as picnics, mountain biking, barbecues, and the like, cause damage to vegetation and soil in the forest and surrounding areas.	-3	-1.35	-3	-0.94
	40. Increased recreational use of the forest (compared to the present) can cause conflicts among various stakeholders, such as forest visitors, forest owners, logging companies, and nature conservation associations.	-2	-0.83	5	2.1
	41. Tourist-recreation services are generally more associated with conservation or environmental protection activities than with productive activities.	0	0.3	-2	-0.62
	42. Areas of greater environmental value require more careful management, especially to concentrate visitors along designated trails, thus avoiding damage to vegetation and soil.	3	0.97	3	1.2
	43. Income generated from forest recreation and tourism can be used effectively to implement natural conservation interventions.	-1	0.1	0	0.14
	44. Forest tourism can promote the creation of connections with the place, reinforce environmental respect, and motivate tourists towards responsible behaviours.	4	1.23	-1	-0.2
	45. The success of forest conservation initiatives is largely dependent on the perception of people and their experiences in the forest.	5	1.41	3	0.9
	46. I'm not interested in collaborating with other forest owners because recreational services are not in my interests.	-5	-2.4	-4	-1.72
	47. I am not interested in collaborating with other owners because similar initiatives have failed in the past and I don't want to waste time.	-5	-2.02	-4	-1.34
	48. I don't believe that collaboration with other forest owners, companies, or tourism entities would work, as there are too many divergent interests.	-4	-1.7	0	0.03

ATTITUDE TO COOPERATION	49. I am willing to collaborate with other forest owners and entities only for ongoing projects, not for new initiatives.	-3	-1.3	-5	-2.2
	50. We already collaborate for what is necessary, with respect to recreational services.	-2	-0.9	-3	-0.9
	51. I would collaborate on the coordinated management of recreational services in the forest if there is someone willing to take care of the organising and planning.	2	0.7	-2	-0.65
	52. To develop the tourism potential of the forest, investments are needed on a larger scale than that of individual forest properties.	2	0.7	0	-0.1
	53. Public support (such as dedicated funding and specific administrative tools) is necessary to initiate collaboration between forest properties and tourism organisations in Comelico and beyond, to develop the tourism potential of forests.	5	1.4	1	0.45
	54. Working on forest management through cooperative forms, it would be possible to plan the use of the forest much better and more efficiently, including recreational functions (e.g., coordinating the creation and management of tourist infrastructure).	2	0.73	2	0.7

3.2 Narrative results

Data gathered during the post-sorting interviews showed that all respondents reside in the municipality of their own Regola and reported experience in the Regole administration before becoming presidents, as well as personal experience in working in the woods, animal husbandry, and farming activities, due to family heritage in such field or personal interest. However, only one respondent was a farmer by profession. Few have received training in the forest sector, mainly through workshops offered in the valley or in nearby towns. The age of respondents was collected but it is not considered relevant for the discussion, given that most participants belonged to only two age classes.

Based on the distribution of the statements expressing the participants' views of Table 4, two factors (from now on addressed as “groups”) were selected and explained based on the statements associated with each group.

Group 1: We are in favour of recreation in the forest, provided that public authorities are supportive and recreationists are respectful of our forests.

This group gathers those Regole with a more positive attitude and open view towards using their forests for recreation by the public, although with some caution. The group explains 25% of the study variance, is defined by eight Q sorts, with an eigenvalue of 3.2. Respondents in this group state that it is worth using forests for tourism and recreational purposes (Statement 27: +2) and believe also that forest recreation can provide more than simply additional revenue (Statement 31: -1), offering other advantages such as jobs creation (Statement 36: +1), preservation of the cultural identity and sense of belonging of local communities (Statement 25: 4). However, they also perceive that recreation will never be able to replace timber production as the main income source (Statement 34: -3) or generate as many jobs as traditional activities (Statement 31: -1). The success and profitability of forest recreation initiatives depends, however, on several internal and external conditions. Respondents agree that implementing forest recreational activities and achieving income improvement requires entrepreneurial training (Statement 33: +1), effort of networking and cooperation, e.g., with tourism organisations (Statement 53: +5), and support for the introduction on innovation (Statement 16: +1). Profitability from forest recreation implies investing in infrastructures (Statement 35: +1), preferably on a valley scale rather than on a single property (Statement 52: +2), as recently occurred when the Regole invested together in the creation and promotion of an historical trail to visit WWI areas, with installation of guidance signs. This is consistent with a general positive attitude towards acting collectively and cooperating with other Regole or forest owners to improve recreational opportunities, as expressed in Statement 54 (+2), particularly when someone would take initiative and responsibility (Statement 51: +2), and with disagreement with statements about not being willing to cooperate (Statements 47: -5; 46: -5; 48: -4). However, one respondent observed that it is difficult to say that there are contrasting visions on forest for recreation among the Regole (Statement 22: 0), because it has not been thoroughly considered and discussed. Regarding external conditions, participants agree that there is a need for public regional authorities to demonstrate proactive behaviour by making specific funds available and introducing specific

guidelines on forest recreation in forest planning (Statements 9: +4; 7: +3). About this, it was reported that many respondents had to invest their own internal financial resources to support initiatives (such as young local entrepreneurs managing mountain huts for hikers, opening local restaurants, and installing cooperatives producing local productions), because of insufficient public funding from rural development programmes. Furthermore, they expressed that it is crucial that recreationists are aware that the forest is a delicate ecosystem that needs to be respected (Statement 24: +3). This is strongly desired and perceived in a cyclic logic, where recreational activities in the forest are acceptable if recreationists are sensitive and respectful, while the success of forest recreation is dependent on sensitivity of those who perform it (Statements 45: +5; 44: +4; 15: +3). Finally, Group 1 respondents were not overly concerned about possible impacts of forest recreation on the environment and its conservation (Statements 37: -3; 39: -3) and think recreation will not cause friction with other forest users, such as conservation associations, other owners, and even harvesting contractors (Statement 40: -2). Nevertheless, they agree with the need for accurate planning for specific sites requiring additional conservation measures (Statement 42: +3). However, while managing multifunctional forests is considered a viable solution to offer multiple FESs (Statements 3: -4; 1: -4; 10: +1), there are doubts on whether or not reducing harvesting to promote recreation will also improve conservation (Statements 41: 0; 43: -1).

Group 2: We are sceptical about recreation in the forest, as it can be risky, but we can think about it if it is done according to our rules.

This second group represents the Regole who are less confident about the advantages of a shift towards providing more recreation, and therefore more reluctant to change. The group explains 13% of the variance, with an eigenvalue of 1.71 and the contribution of five Q - sorts. Similarly to Group 1, these respondents generally recognise the increasing importance of forests for recreation (Statement 17: +4) and do not strongly oppose the idea of including recreational objectives in their forest management, based on a cooperative process (Statement 54: +2).

However, Group 2 is characterised by a certain distrust of the opportunities represented by forest recreational activities from different perspectives. First, although the role of forest recreation in job creation and revenues is recognised (Statements 35: +1; 36: +2), the common opinion is that recreation could provide only a small share of total revenues (Statement 34: -4), which is probably why Group 2 believes that balancing productive and recreational functions is a key issue (Statement 23: -2). Next, there is fear of potential damage to forest regeneration (Statement 38: +5), which is a key practice in forest management in the Italian Alps. Although specific recreational activities such as picnicking or mountain biking per se are not perceived as risky for forest conservation (Statement 39: -3), the group is rather sceptical that increased recreation in the forest would also mean better forest conservation, for example, by reducing harvesting (Statements 18: -3; 43: 0) or by introducing conservation measures to make forests more attractive for visitors (Statement 41: -2). Concerns of conflicts among different stakeholders are also expressed (Statements 40: +5). Respondents disagree that forest owners are generally uninterested in training and investing for forest recreation (Statements 21: -3; 19: -2) or ignoring general opportunities of forest recreation (Statements 14: -1; 11: -1; 20: -2), however they oppose increased number of trails to facilitate forest access (Statement 26: + 5). Similarly to Group 1, the sensitivity of recreationists is also considered as a key element to make forest recreation acceptable (Statement 24: +3). About this, the Regole in Group 2 have a generalised perception that forest recreation is a public good taken for granted by society (Statements 29: +4; 30: +1) and not properly addressed in forest planning by regional authorities (Statement 2: +2). Regarding cooperating for recreation, there is some predisposition to work together to provide recreational services (Statement 54: +2) and acknowledgement of room for improvement (Statements 50: -3; 49: -5). However, there is uncertainty about the actual feasibility of working with the other Regole and actors in the tourism sector (Statements 48: 0; 52: 0), due to perceived contrasting objectives and needs amongst the Regole (Statement 22: +2), doubts on the possibility of implementing a real multifunctional forest management (Statements 7: 0; 3: -4)

and a perceived risk of compromising the traditional functions, such as timber production (Statement 13: 0).

4. Discussion

Similarly to what occurred with NIPFs (Weiss et al., 2019; Ziegenspeck et al., 2004; Živojinović and Wolfslehner, 2015), our results document that also in the Regole as cases of community-owned forests, there is generally an ongoing shift from traditional objectives to a wider range of goals. Such transition led to new views and more diversified forest management objectives and models, which are now considering inclusion of non-provisional FESs like recreation. Our data reveal a general attitude of the Regole to respond positively to the new and wider social demands for FESs. This could be connected to a new perceived responsibility in managing forests and to a search for a new societal legitimacy as forest owners, in line with what was noticed for NIPFs by Deuffic et al. (2018). In the case of the Regole, this new role has already been formalised in the new National Law on community-owned land. However, its implementation on the ground still faces a number of challenges, as shown by the views of the Regole in our case study.

The two groups identified through the use of the Q methodology share a general positive view of the management of forests for more recreation by the public, in line with the findings of other research on forests owned or managed by communities (Nhem and Lee, 2019; Rodríguez-Piñeros and Mayett-Moreno, 2015; Dalla Torre et al., 2022). This attitude could be related to the traditional and institutional mandate of the Regole to provide for public needs, as highlighted by (Merlo et al., 1989). However, traditionally, the 'public' for Regole referred to the community of its members, and not to society at large: although mountainous areas are now affected by a larger demographic dynamism (Bender and Kanitscheider, 2012) and the shift toward a more inclusive idea of 'community' is still a challenge for several rural alpine communities (Dalla Torre et al., 2021). In fact, a closer examination of our results reveals that the shift towards forest recreation is more intertwined with the search for additional revenues for the community than with the

desire to meet a generalised societal demand. In this way, the motivations of the Regole are inspired by private objectives not far from those of NIPFs (see e.g. Bjärstig and Sténs (2018) for Swedish forest owners). Furthermore, both groups stated that timber is and will remain the most important FES and the largest source of income from their forests. This can be seen in connection with the cultural and historical legacy of the Regole, back when they were the main suppliers of timber for the shipyards of the Venetian Republic (Bonan and Lorenzini, 2021). Indeed, the attachment to tradition and the continuity with the past often emerge as a distinctive trait of Regole's self-representation (Pieraccini, 2013). Contrastingly to some NIPFs, our understanding is that the Regole struggle to see themselves as entrepreneurs, either by vocation or training, because of perceived discontinuity of leadership, multiple visions amongst commoners, and lack of a managerial and business lore in the community. In the past, this led to the delegation of recreation initiatives to other local actors.

The theme of forest conservation also emerged as a relevant issue, in connection once again with the Regole legacy: ultimately, conservation is an act of responsibility for future generations of commoners. The high environmental values that characterise their forests resonated strongly in both groups during interviews, which is reflected in the care they exercise in sustainable forest management activities. In fact, when discussing the admission of recreational uses, several respondents stressed that public access should be limited to trails, forest roads, and clearly defined recreation areas, not to the entire forest estate. These limitations were linked to fears of damage to the soil, natural forest regeneration, and collection of non-wood forest products by commoners. These emphasis and attention to conservation and prevention of possible damages seem to counter the risk of 'tragedy of the commons' issues by increasing recreational access to Regole's forest. It is also interesting to note that the Regole expect the public to adopt a sensitive and respectful behaviour towards the forest: even if they are reconsidering their role in society, the Regole are unwilling to give up their guiding principles, but rather count on acknowledgement and acceptance of their principles by those using their forest.

More nuanced positions of the Regole about recreation are at the basis of the differentiation in the two groups. Group 1 generally represents a more progressive point of view on forest recreation, given that forest management for recreation is an innovation for the local forest sector, mainly due to its current absence in the local forest management planning. The support for such innovation is related to organisational capacity, as recognised by respondents in Group 1, who acknowledge the role of a process leader and highlight the need for public financial support and cooperation between private actors, in accordance with recommendations by Winkel et al. (2022). Group 1 has a more entrepreneurial attitude and is aware of the need for specific managerial training and new skills, in line with what is expressed at European scale (Mann et al., 2010; Sténs et al., 2016). It also calls for attention from public institutions, with new planning rules and financial support, confirming what was observed by Kittredge (2005), and perceives the benefits of collaboration between the Regole and with other stakeholders. On the contrary, Group 2 gathers those more sceptical toward recreation, more anchored in the tradition of forest management and more focused on conservation, with a higher perception of the risks of transformation and a lower inclination towards collaboration with other stakeholders or regional authorities. These different positions reflect well the dilemma, widely discussed in the commons literature, between tradition and innovation, and the challenges that commons face today (Jungmeier et al., 2021; Kissling-Näf et al., 2002; Kluvánková et al., 2018; Louda et al., 2023).

5. Conclusions

Community-owned forests are not a new actor in the forest ownership landscape, and they own a considerable portion of the forest area in the Alps and other European and non-European areas. However, their potential and actual contribution to the provision of FESs is often neglected by research. This work aimed to cast light on their role in responding to increased demand for FESs, in particular, focussing on recreation as an example of a non-provisional FES.

With reference to NIPFs literature, the article also aimed to understand if views of common owners are closer to those of individual private owners or of public forests managers.

Our results have highlighted that the attitudes and motivations of historical community-owned forests institutions of the Alps towards opening their forest to the provision of recreation to the public are not very far from those of traditional NIPFs by seeing recreation and other non-provisional FESs mostly as services for the commoners than for society at large. Timber harvesting as an income-generating activity and, amongst non-provisional FESs, conservation of heritage seem preferable to the provision of recreation, which requires investments and acquisition of a more business-oriented mindset, a path which the Regole seem partially reluctant to follow. This attitude can be explained by the strong importance of legacy and tradition ingrained in the social fabric of the Regole, allowing their persistence for a long time, but also inducing some resistance to change and innovation. This somewhat contradicts our expectations that commoners were more sensitive than NIPFs to provision of FESs with a wider social dimension and leads us to conclude that the contribution of community-owned forests towards the provision of recreation in the near future will be similar to that of NIPFs.

However, these findings are limited by the fact that our research only considered the Regole, which are historical community-owned forest institutions, not including the new forms of commons or community-forests that are emerging in several parts of the world. In fact, it is possible, and probable, that results in terms of openness to innovation in FESs for less traditional or new experiences of community forests are different. Hence, future investigation should be extended to other types of more recent commons. Another limitation of the study is related to the fact that the interviewees, i.e., the elected presidents, may not have represented the full spectrum of viewpoints within their communities, but only those of its majority. Therefore, a next step of the research should involve more commoners, especially those representing minorities (e.g. young people, women, or nonmembers of Regole). This however cannot be

achieved through Q methodology, but requires the use of other approaches for data collection and analysis.

Our findings can be useful in stimulating political action at Regole and other community-owned forests. To nudge the change, the aspiration for new legitimacy as forest owners in front of society could be used as leverage. These actions should start from the group of Regole that is more responsive and open to change. Support should be offered in the form of mentoring, entrepreneurship training, specific forest planning tools, funding, improved extension services and stimulating local networking and collective actions among community-owned forests and other local institutions.

Finally, it is necessary that public institutions such as the State, which issued the new National law on community-owned land, and the regional government, responsible for forest policies, as well as the Regole themselves, take initiative to raise awareness in society about the existence, role, and value of community-owned forests and their institutions. This initiative could support the development of a shared view on how to manage and use collectively the forest resources.

Declaration of competing interest

The authors have no competing interest to declare.

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Ethics

The research was granted an ethical waiver by the Ethics Committee of the Tesaf Department, University of Padova. The data are treated in an aggregated form and it is not possible to identify individual responses. Also, the participants were anonymized.

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Declaration of interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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