Restoration as a re-commoning process. Territorial initiative and global conditions in the process of water recovery in the ‘Cordillera de Nahuelbuta’, Chile

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ABSTRACT
Restoring ecosystems in Chile is urgent, given the negative impacts of the prevailing extractive development model. The articulation of collaborative relationships between land and resource owners and the communities who inhabit and form a part of ecosystems has turned out to be a key variable in this activity. The empirical basis for the present study is a case that reveals how a network of women inhabiting the ‘Cordillera de Nahuelbuta’, on the border between the Biobío and Araucanía Regions in southern Chile, began a restoration process linked to several stakeholders of the basin. We employed qualitative and ethnographic methodologies to collect and analyse the perspectives of various actors involved. This research included 16 in-depth interviews, participant observation, and the analysis of secondary sources. Among the factors that made this experience possible are: i) community motivation, ii) the requirements imposed by an international certification that impelled forestry companies to participate in projects incorporating local peasants, and iii) the availability of other actors and wills in civil society, all assembled to promote restoration. Today, obstacles that could impede the further development and sustainability of the experience arise from the difficulties of maintaining permanent coordination with the corporations and whether they value the sustainability of these initiatives. This venture eventually evolved into a restoration cooperative run by members of the local community of peasants and small-scale farmers. This experience is highly relevant for socioecological studies since it shows that restoration initiatives can integrate disparate interests responding to distinct paradigms of nature and economy.

1. Introduction
Over the last few decades, forestry companies in south-central Chile, whose lands border rural and indigenous communities, have renewed efforts to control the impacts of their operations and have paid greater attention to the relationships they establish with neighbouring peoples (Carrasco and Salas, 2016). These efforts are related to the globalisation of sustainable forest management certification systems which regulate world paper and wood markets (Marx and Cuypers 2010). In their concrete expression, these systems have permitted the formal recognition of local communities, within strict limits and without restoring fundamental rights, creating spaces that allow the expression and construction of new senses of re-commoning. This socio-ecological process of re-commoning involves goals oriented towards the common good of all the inhabitants of a territory, linked to the restoration of native ecosystems that are fundamental to good territorial governance.

This study was carried out in the so-called ‘forestry territory’ of south-central Chile (Farris and Martinez 2019), which has been marked by the progressively expanding monoculture of exotic tree species like pine (Pinus radiata) and eucalyptus (Eucalyptus globulus) over the last 40 years. This expansion has wrought a substantial transformation in land ownership structure, installing the ‘forestry company’ on the map of social actors in these territories. The Chilean State has promoted forestry operations through substantial subsidies, which together with deficient environmental protections for native forests, has created negative consequences for the natural ecosystems and inhabitants of this territory (Camus 2006; Klubock 2014). The displacement of nearby communities, the impoverishment of local economies, and the reduction of size and access to Mapuche cultural and sacred sites have been documented (Aylwin et al. 2013; Montalba and Carrasco 2003). Other consequences include the substitution, reduction, and fragmentation of the native forest and the concomitant decrease in biodiversity (Otavo and Echeverría 2017), the decreases in freshwater water volumes and quality, producing notorious water scarcity in communities situated near tree plantations (Torres-Salinas et al. 2016), and the increases in forest fires’ frequency and intensity, with the worst in recorded Chilean history occurring in the summer of 2017 (Bowman et al. 2019). Due to this range of impacts, many indigenous and peasant communities, as well as socio-environmental
organizations, have spoken about the need to fundamentally revert water scarcity via reforestation with native species (Torres-Salinas et al. 2016; Mapuexpress 2017).

In this context, for more than a decade now, forestry companies have entered a new phase in the type of relationships they maintain with local peasants and indigenous communities, responding to the requirements imposed by international forestry management certification systems. Numerous initiatives involving forestry companies and local communities have begun, such as the development of a tourism hub with the participation of Mapuche communities in the Llué Llue Lake and the CMPC company, or the Forestry Dialogue itself, where companies meet with representatives of communities and NGOs. However, these have failed to show a significant impact neither on socio-economic statistics nor on the structure of power that still maintains unequal social relations (Grosser and Carrasco 2019). Among the social actors, Mapuche communities and their historical demands regarding diverse approaches to economic development and ancestral rights appear relevant. Forestry companies have initiated cooperative relationships with many of them, thereby managing to maintain some stability in neighbourly relations. Nevertheless, a part of Mapuche society does not dialogue with forestry companies, because they are considered to be the face of transnational capitalism in their territory and the main antagonists of their projects for national autonomy and self-determination (Llaitul and Arrate 2012). On their part, forestry companies develop their productive activity within this context of heterogeneous positions and possibilities, opening themselves up gradually to articulate with other local actors and to participate in initiatives that integrate them.

In this difficult socio-political context, forestry certification systems’ impacts are expressed through this complex web of territorial social relations (Farris and Salgado 2019). The study shows that new governance initiatives were created to meet international standards. These new governance initiatives force the companies to engage with stakeholders and communities and take part in initiatives within the framework of the territory or basin, but they do not create enough engagement to the various parties involved to assure their sustainability. This illustrates the new ways in which the global economy acts in territories with cultural diversity, economic inequality, and ecological crisis. However, these are applied simultaneously to a permanent and intensive production system of forest plantations. Therefore, these governance methods force human communities who live in the basins to adapt to those conditions.

The present work aims to reconstruct a restoration experience in the ‘Cordillera de Nahuelbuta’ that led to the creation of the Restauradoras de Nahuelbuta Cooperative. The hypothesis that animates the research establishes that ecosystem restoration, particularly for those associated with water in a scarcity crisis context, promotes processes that allow the convergence of interests of various natures and reaches. From a re-commoning perspective, these various interests can come from both the global and hegemonic economic paradigms of sustainability, and the culturally heterogeneous territories themselves. The research questions used to approach this hypothesis are:

- a. How can ecological restoration be conceived and implemented as a re-commoning tool?
- b. What are the limits of the hegemonic forestry management paradigm when faced with critical and complex water protection and restoration processes?

The case study took place in a territory in dispute, wherein the rationale of large-scale transnational commercial production and the rationales of local Mapuche and peasant communities contend (Rodríguez Henríquez 2019). These latter rationales involve understanding the basin as a common space where human communities interact daily with the ecosystems and identify themselves as part of it. It is also a territory with unique ecological characteristics, which imply a diversity of interests concerning conservation. The principal objective of this study is to highlight how different perspectives, interests, and practices operate in the restoration of a single territory and identify the conditions and obstacles which present themselves against restoration as a re-commoning process. More specifically, we seek to: a) describe the expression of different conservation interests (international certification and re-commoning), b) illustrate the stakeholder’s articulation within the restoration experience, and c) systematise the re-commoning practices associated with ecological restoration for water conservation in the basin.

The methodological design is based on the collection and analysis of first-person accounts and field notes about the social actors experiencing the process. These were compiled by carrying out in-depth interviews and through participant observation. Analysis of secondary and documentary sources also served to enrich the context of the initiative and follow up on it.

2. Conceptual framework

Ecological restoration is usually understood to be the protagonist in the battle against deforestation and climate change (Stanturf et al. 2014; Budiharta et al. 2016). In this vein, narrowly practical and ecological studies have relegated the political, social, and economic aspects of these problems to the background, expressing an unequal relationship between science and society in the study of restoration projects (Eden and Tunstall 2006; Budiharta et al. 2016) and
showing a product-orientated venture rather than a process-orientated focus (Baker et al. 2014).

Sustainable Forest Management (SFM) has been globally established as a form of forestry governance that seeks to halt the indiscriminate use of forestry resources by promoting sustainable production of the various goods and services they provide, paying special attention to growing demand and future projections of ecosystems sustainability (Adhikari and Baral 2018). One key SFM tool in forestry certification, which appears as a market initiative ‘aimed at improving the quality of forest management and promoting higher prices or better market access for wood products derived from sustainably managed forests’ (Siry et al. 2005, p. 557). In this way, and according to Carrasco (2015, p. 101) we can understand forestry certification processes as: ‘globally established instruments to control capitalist externalities and resolve its’ sustainability’. Within this framework, while this mechanism offers certain improvements for forest management and proposes a dialogue between different actors, it is not a transformational tool as it does not question the goals of production (Carrasco 2015). It is more of rectification of practices based on a hierarchical scheme that does not properly address local peculiarities (Adhikari and Baral 2018); and which continues to have problems associated with monitoring its operations and therefore, the capacity to obtain verifiable results (Moog et al. 2015; Agrawal et al. 2018; van der Ven and Cashore 2018). Therefore, from an anthropological viewpoint, this tool can be observed as a process that at a local level problematises the socioeconomic scenario, generating impacts on businesses at the level of both internal relations and their inclination towards the rest of the world in a diverse and complex operating stage (Carrasco 2015).

Nevertheless, the instrumental use that corporations make of local participation and agreements made with local actors increases their distrust in the territories where they operate (Carrasco and Salas 2016). Under these circumstances, the configuration of the socioecological systems is complicated; this turns out to be especially true in culturally diverse contexts, where local knowledge is involved in the creation of collective experiences (Trigger et al. 2008; Bilbao et al. 2016; Fuentealba and Sevillano 2016; Ayaviri et al. 2020) and spiritual and commercial interests contend in determining the logic and incentives of conservation (Lamprea 2019).

From the conceptual point of view, the socioecological system will be understood as an assemblage of resources, users, and legal subsystems (Ostrom 2009). This perspective allows us to comprehend that sustainability involves much more than economic, social, and environmental issues. In this sense, the most critical aspect that socioecological system studies have revealed is the concept of governance. The scientific literature has verified that its sustainability relies on consideration of facets such as land and resource rights, agreement monitoring, and the character of the institutions that are a part of socioecological systems (Tucker 2010). In this regard, equity among the actors in the system is a critical issue, when it comes to ensuring the management of common goods that can assure sustainability (Njaya 2007; Oberlack et al. 2015). Definitively, to the degree that the range of actors becomes more heterogeneous, the more complex the socioecological system will be, as knowledge systems reflecting diverse reasoning face each other (Janssen and Ostrom 2006).

These epistemological considerations are essential because imaginaries related to restoration are mediated by the generally different goals and perceptions of the social actors involved, a fact usually observed in restoration experiences in Latin America (Ceccon et al. 2015; Meli et al. 2017). This involves cases of diverse, overlapping institutional and sociocultural levels and economic rationales. Thus, it is pertinent to utilise polycentric perspectives of governance (Ostrom 2010) where different communicational rationales are identified (Urquiza et al. 2019) and visualise their interactions in the settings of restoration processes. The conceptual contribution of this article is to bring visibility to the recommoning process in ecological restoration, where different rationalities and interests converge.

On the other hand, the defence of common goods in contexts marked by global economic expansion constitutes one of the primary forms of social conflict in Latin America (Composto and Navarro 2014; Svampa 2015). From the study of conflicts in the face of extractive activities, Gudynas (2014) conceptualises these conflicts according to the degree of intensity they present. In this way, we can find conflicts of high, medium, or low intensity, depending on the capacity to mobilise confrontation towards the public sphere, as well as the level of pressure from one sector to another and their actions’ aggressiveness. This pressure is exerted by a range of actors, which generally present the promoters of extractive businesses on one side, and a varied group of actors on the other including peasants, neighbours, indigenous people, NGOs, and others. The final group generally generates pressure alliances to block extractivist projects or to coexist with them while demanding the fulfillment of demands which they consider vital (Gudynas 2014).

In every case, the imposition of a hegemonic geo-environmental imaginary can be observed (Estenssoro 2019), one that inevitably confronts local and territorially based constructions of nature. In these constructions, characterised by cultural and economic diversity, processes associated with the recovery of notions of common goods are developed and reproduced, within a sustainability framework wherein capital does not predominate, but rather other principles. These principles are linked to the utilisation and preservation of common goods through collective modes that guarantee the reproduction of life-based on socioecological aims (Svampa
For this reason, many experiences reveal the importance of the ‘common good’ as a central tenet of any integrated watershed initiative (Abita, 2018; Jara 2017). Commoning refers to: ‘processes of sharing experiences of cocreation, self-governance and reproduction of natural and social resources’ (Baud et al. 2019, p. 268), underdevelopment, and the deepening of relations through significant practices regarding care for others and nature (Euler 2018). In other words, commoning becomes a socio-cultural and political tool for local communities and can be identified in collaborative and joint initiatives. We use the term re-commoning to denote a process with a correlation with the past, understanding that multiple forms of commoning have taken place since ancestral times, but have been threatened by the expansion of capital and subsequent resource privatization (Svampa 2012; Escobar 2012). This places it as a historical and political imperative for communities that have been rendered invisible and which now reappear in a new geopolitical scenario (Escobar 2016). According to the local forestry expansion scenario, the re-commoning process studied emerged from the pressure that affects all stakeholders and interests in multiple ways such as forestry companies (conditioned by the market and international standards) and the local communities (organised around restoration interests to inhabit the basin and continue being part of it).

3. Materials and methods

3.1. Study area

The ‘Cordillera de Nahuelbuta’ geographically frames our case study. It is a stretch of the Coastal Mountains which dates to the Paleozoic (about 570 million years ago) in the geographic coordinates of 37°43’S, 73°02’W. These mountains run for about 190 kilometres from North to South and about 50 kilometres east to west at their widest point, and their highest peak reaches 1,440 m.a.s.l. (Hoffmann 2005). The climate varies from the warm-subhumid Mediterranean in the North to humid-temperate and rainy in the South. The annual precipitation on the Nahuelbuta mountain range exceeds 3000 mm compared to the lowlands around it with about 1000 mm/year. Its name comes from the language of the Mapuche people, the Mapuzungun, which has historically inhabited the area and means ‘great puma’. During the glacial period, this mountain range served as a refuge for species that would later form the vegetation throughout Southern Chile. Due to the presence of vast biodiversity, the ‘Cordillera de Nahuelbuta’ is considered a ‘hot spot’ for wildlife conservation worldwide (Wolodarsky-Franke and Díaz 2011). Paradoxically, they suffer from ‘the most significant ecosystemic alterations and scarce environmental protections’, evincing a profound transformation of the landscape and increasing fragmentation of their forest (Baeza et al. 1999, p. 11).

The study was carried out in the small cities of Contulmo and Purén, on the border between the Biobío and Araucanía Regions and within the Cordillera de Nahuelbuta. In both cities, multi-dimensional poverty is above the national average percentage (Table 1; Observatorio Social, 2017). Because of this, both cities have advanced in recent years from a silvoagricultural model towards one based on tourism and service sectors, highlighting the value of the natural beauty of the region and their cultural attributes, related to Mapuche and European colonisers.

The restoration experience was carried out in the sector of Pichiwencuoye (Figure 1), a community established at 700 m.a.s.l. on the boundary between the two cities mentioned above. Our research was carried out primarily on the eastern hillside of the Lake Lalalhue Watershed, with a great interest in regional institutional restoration instances. About 35 peasants and small-scale farming families live there in a subsistence economy based on grain cultivation, home garden, pig and chicken husbandry, collection, processing, and sale of firewood and wild fruits and nuts (principally Gevuina avellana).

| Demographic indicator                  | Contulmo | Purén |
|----------------------------------------|----------|-------|
| Total population                       | 6,031    | 11,779 |
| – Indigenous Population (%)            | 30%      | 28%   |
| Total Urban/Rural Population (%)       | 50.8%    | 64%   |
| – Urban                                | 49.2%    | 36%   |
| – Rural                                |          |       |
| Land use (ha)                          | 33,023.4 | 17,505.2 |
| – Forest plantation                    | 15,130.8 | 10,717.6 |
| – Native forest                        | 1,852.3  | 9,745.9 |
| – Agriculture                          |          |       |
| Multi-dimensional poverty (%) from total population | 30%      | 40.1% |
| Educational level of heads of household (average number of years) | 8.3   | 8.1   |

Data from INE (2017), CASEN, (2017); CONAF, (2020).
3.2. Data collection

The research was based on a qualitative design seeking: ‘to understand the particular meaning that actors ascribe to incidents and actions, and to contemplate these elements as pieces of a systematic assemblage’ (Ruiz Olabuénaga 2009, p. 17). The initiative constitutes a case study that reconstructs an unprecedented experience of native forest restoration in Chile, paying particular attention to the relational dimension between the various actors who formed a part of the initiative. This method focused on interactions allowed us to understand how agreements were established and restoration activities planned in the socioecological system of the watershed.

An ethnographic study was conducted between May and August 2018, including designing and carrying out in-depth interviews, participant observation, focus group activity, and secondary source analysis (Table 2). Thanks to the collaboration of a representative of the locally active NGO Ética en Los Bosques1 (henceforth EELB), we were able to access the community and conduct our first interviews, which allowed us to identify the range of actors present in the initiative. This group of actors is comprised of: Members of the Restauradoras de Nahuelbuta Cooperative, NGO representatives, political and territorial actors, and forestry company employees (technical advisors and restoration project representatives). Almost all actors directly involved with the initiative were interviewed in this study, while some people could not be included due to their unavailability. An in-depth interview technique was used considering its flexibility and non-standardised nature, implying ‘face-to-face encounters between the researcher and informants directed toward understanding informants’ perspectives on their lives, experiences, or situations as expressed in their own words’ (Taylor et al. 2016, p. 102). In total, 16 people were interviewed following a battery of guiding and exploratory questions (see Table A1); 10 of them belonged to Restauradoras de Nahuelbuta Cooperative. This enabled us to better understand the configuration of the re-commoning process from the local viewpoint. For some people, it was necessary to conduct follow-up interviews to clarify and deepen some ideas. These interviews were carried out in different communities of the Biobío and Araucanía Regions, mostly in the interviewees’ houses or in some nearby restaurants. The interviews lasted approximately 90 minutes and were recorded on audio for subsequent transcription.

To complement the interviews, we used participant observation, which involves a systematic and controlled observation of everything that happens around the researcher, participating in various population activities (Restrepo 2016). We used this technique during diverse
Table 2. Synthesis of the methodologies utilised and the participating actors.

| Interviews | Member of the Restauradoras de Nahuelbuta Cooperative | Forestry Companies | Other actors |
|------------|-------------------------------------------------------|---------------------|-------------|
| ● 10 interviews applied to active and non-active members of the Restauradoras de Nahuelbuta Cooperative | ● 3 interviews applied to the representatives and technical advisors | ● 3 interviews applied to ‘Etica en Los Bosques’ advisors and political-territorial actors |
| Participant observation | ● Workshop to assess the results of the Tourism and Conservation project. | ● Training workshops carried out by the technical advisors of a forest company to the Restauradoras de Nahuelbuta Cooperative. | ● Workshop to assess the results of the Tourism and Conservation project. |
| ● The workday of the Tourism and Conservation project. | | | ● The workday of the Tourism and Conservation project. |
| ● Plant production, visits to greenhouses, visits to restoration sites, and daily life activities of the Restauradoras de Nahuelbuta Cooperative members (carried out throughout the fieldwork) | | | |
| ● Training workshops carried out by the technical advisors of a forest company to the Restauradoras de Nahuelbuta Cooperative. | | | |
| Focus groups | ● Focus group to assess the results of this investigation | | |
| Secondary materials | ● Minutes of Restauradoras de Nahuelbuta Cooperative meetings | ● Ríos’ undergraduate thesis (2016) |

Adapted from Mendoza Leal (2018).

activities, allowing us to better understand cooperative members’ daily lives, the networks of actors and institutions with which they interacted, and the cycles of plant production and the local geography. While fieldwork was performed, secondary sources related to the experience were revised, which helped flesh out the case description. Finally, we conducted a focus group that enabled us to refine and complement the preliminary result of the study.

The transcription analysis was done using Nvivo qualitative analysis software, following an inductive analysis allowing us to carry out general categorization by themes. This step was followed up by an analysis that grouped these lesser categories according to the research questions and the concepts described in the conceptual framework. Due to the heterogeneity of actors interviewed, it was possible to collect and contrast distinct visions regarding the restoration experience, which give a deeper meaning and complexity to the analysed practices. This allowed the identification of the following categories of analysis: interests and motivations of the process, the restoration process, the organisation of the Restauradoras de Nahuelbuta Cooperative, re-commoning of native forest, stakeholder articulation, and conditions/space of governance in the restoration. These categories were also compared with other data collected through other methods (participant observation, focus groups, secondary information, among others). Consequently, we could reconstruct and situate the different perspectives on the process according to the level of involvement of each stakeholder in the different activities of the restoration initiative.

4. Results

4.1. Cordillera de Nahuelbuta: a confluence of distinct conservation interests

Due to the characteristics described above, the ‘Cordillera de Nahuelbuta’ is a territory in which distinct conservation interests converge. This diversity of interests was confirmed in the interviews we conducted and in the educational and community dialogue spaces where the strategy of participant observation was applied. What are these diverse interests, and how might they be described?

The global sustainability paradigm appears in the territory through international forestry certification standards which companies must fulfil. These standards require companies to restore ecosystems that they have harmed, focusing on protecting water systems, high conservation value areas, and endangered species (FSC 2012). The professionals interviewed reaffirmed this discourse, arguing that their respective companies planned to increase the size of protected areas, privileging these sectors due to their characterisation as high-value conservation areas based on the high degree of biodiversity and endemism in the Cordillera de Nahuelbuta. Forestry companies also recognise that in addition to these interests, there are pressures exercised by local organisations in community mediation spaces coordinated by government agencies that relate to the recovery of Lake Lanalhue Watershed tributaries.

Second, we may acknowledge the interests of the State, which participates in a complementary fashion through different instruments targeted towards territorial planning and environmental conservation. In
this context, Lake Lanalhue was declared as a ‘Zone of Interest for Tourism in 2018’. This declaration constituted an instrument of public-private management promoting tourism, an activity that until the Covid-19 pandemic had been increasing in importance in the local economies of Contulmo and Purén.

Third, inspired by the political practice and scientific knowledge, there were representatives of the NGO Ética en Los Bosques (henceforth EELB) and other local actors, who supported the local community in an advisory role during the formation of the Restauradoras de Nahuelbuta Cooperative. These actors insisted that it is necessary to move toward a paradigm of large-scale restoration with great urgency. This is imperative for them, given the over-exploitation of watersheds produced by the replacement of native forest with exotic tree plantations. From this perspective, restoration is viewed as a process of struggling for water and biodiversity recovery, which local, territorial organisations have been engaged in for years. This recovery would bring the recovery of the water cycle together with the restoration of new biological corridors, as well as a dynamization of the links between the local economy and nature.

Fourth, the local communities’ interests focus on recovering the quality and quantity of water, an interest that manages to involve all the implicated actors. Other commonalities among the inhabitants of the watershed include the recognition of a critical loss of biodiversity, which has gradually affected their quality of life, impoverishing it materially and immaterially. Since this loss of biodiversity is associated directly with the expansion of exotic tree plantations, local communities continually demand that forestry companies invest in conservation and restoration initiatives. Following public territorial guidelines, the inhabitants of the sector also currently manifest an interest in conservation, to aid the development of cultural tourism (Carrasco and Fuentealba 2019).

4.2. The restoration experience and the creation of the cooperative ‘Restauradoras de Nahuelbuta’

Due to FSC forestry certification requirements, in 2013, forestry Company 12 decided to design a pilot restoration program in one of its areas of production (Figure 2). To do so, they chose the Pichiwenuyoy sector to carry out an environmental mitigation action, on areas that the company had previously clear-cut and replanted with exotics. According to the person who led this pilot program at that time, the decision was taken into consideration of three factors: i) because Eucalyptus globulus did not grow well in these higher-altitude locations, ii) to respond to the demands raised by local and regional communities to promote the recovery of watersheds, and iii) in consideration to the specific ecological characteristics of the area, regarded as highly valuable to conservation.

Additionally, this pilot program sought to incorporate the participation of local people in the restoration process. It would allow the corporation to meet the social requirements of certification and generate closer relationships in the community – with an eye to deescalating social conflicts related to exotic tree plantations. In this regard, the stakeholders present during the initiative argue that social pressure is a critical aspect enabling restoration processes. Figure 3 illustrates that all

![Figure 2. Timeline of actors’ experience and articulation in the restoration experience.](image-url)
stakeholders, even from their different standpoints, include social pressure in their narratives and identify it as a constant throughout the development of the process. In other words, pressure is established as a legitimate mechanism for communities to raise visibility and create encounters with forestry companies in governance spaces. Companies themselves also recognise that social pressure gives rise to mechanisms that can help serve their purposes:

It might be, that we say we are going to restore passively and the FSC won’t say anything to us, but let me go back, the thing I said to you, now social pressure is high, and I think the companies have seen that [restoration] is a powerful tool to improve the relationship with local organizations, stakeholders. (...) It’s a strategy from that point of view (Forestry Companies - Informant 13)

Therefore, social pressure appears to be a constant and a condition throughout the entire organization process for restoration governance. In other words, without communities’ social pressure the companies will not act, and participative watershed governance will not be possible.

According to the previous figure, the following aspects are identified: Restauradoras de Nahuelbuta Cooperative assesses the restoration process from local history, conscious of territorial fragmentation and the destruction of their biodiversity to raise restoration as a demand to achieve social and ecological justice. For their part, forestry companies understand and assume these demands by proposing dialogue to bring some stances that have been constantly strained closer together. Finally, other actors intervene in these stances through political and territorial work in governance spaces, such as socially pressuring forestry companies to fulfil their agreements and achieve recovery in the basin.

In this sociocultural scenario, the corporate team responsible for the pilot restoration program invited the local community to get informed and participate as workers on the worksites chosen for the initiative. The presentation of the initiative took place during a local community celebration of Mothers’ Day. This factor favoured the significant participation of women that day and that the working group was mainly comprised of women.

Later, the forestry company entrusted to this group the work of transplanting the native plants among the Eucalyptus trees about to be harvested. The next step would be the reforestation of these sites with the same species that had been extracted. While the restoration activities were going on, the pilot program was made public to the business community and organisations concerned with forestry development and the environment. On these occasions, the initiative stood out, principally for the inclusion of the community in the process, which is an uncommon practice in the forestry sector. This practice piqued the interest of an EELB that worked in the region, who wanted to engage in this experience and proposed linking itself with a community organisation of women to become a relevant actor in the restoration project, beyond the provision of services.

From this moment on, a representative of EELB became the principal advisor and promoter of the initiative, supplying the local women with the tools they needed to decide what and how would be the best way to move it forward. This advice and accompaniment included training on leadership, self-esteem, and organisation. Another important theme for women in these workshops was the forestry companies’ certification process and all its implications. With this training, women could position themselves on a global stage, understanding that companies had to create restoration programs to compensate for the thousands of hectares of the native forest they clear-cut and replaced with monoculture plantations of exotic trees.

During this period, women—and a few men who later became part of the group—periodically received training related to restoration, organised both by Company 1 and the EELB. As a result of this process, in 2014, the Restauradoras de Nahuelbuta Cooperative was created. This cooperative is dedicated to the ecological restoration of the landscape, linking quality and quantity of water to the native forest with the reestablishment and dynamization of traditional cultural and economic practices in the territory.
By the year 2015 and after its formalisation, the restoration initiative with Company 1 was on hold due to the departure of the CEO at that time and the refusal of the new management to continue with the process. This fact caused great uncertainty about the future of the restoration process in the territory since the initial conversations with the company had estimated a restoration process with other geographical ranges (some stakeholders mentioned that the agreed surface reached 100 hectares). Therefore, many plants prepared for the process died due to the lack of irrigation caused by water scarcity.

These situations caused the discouragement of many participants, including desertion from the organisation in some cases. Regarding this topic, the Restauradoras de Nahuelbuta Cooperative and other stakeholders involved in the process noticed a weakness in the organisation of the initiative during the same period. According to the Restauradoras de Nahuelbuta Cooperative members, part of this situation was caused by the continuous need to pressure the companies to fulfil their agreements and the needs of the territory.

From this situation and following the idea to continue the restoration of their territory, the Restauradoras de Nahuelbuta Cooperative and EELB demanded that Company 2 get involved in the restoration process. They managed to restore 9 hectares, which meant that the Restauradoras de Nahuelbuta Cooperative sold plants, did restoration work on-site, and handled sales of lateral protections and their installation. Afterwards, to create new opportunities in the Restauradoras de Nahuelbuta Cooperative market, EELB in 2017 arranged a work agreement for 3 years with the same company. This agreement included the following objectives: a) create opportunities for productive development, b) create cooperation agreement to improve the capacity to produce seed and plants, c) define restoration and monitoring activities of restored areas, and d) create opportunities to commercialise products and acquire supplies.

According to an Restauradoras de Nahuelbuta Cooperative member, at the time of discussion, the agreement had met most of its objectives except the one regarding the restoration and monitoring activities. From 2015 to date, they also included among their commercial activities the sales of plants to Company 3, but there are no formal or regular agreements with them. In general terms, the way this experience developed involved a joint effort to develop a restoration process in Pichiwenucoye with positive effects on recovery in the basin. According to this directive and with an understanding of the diversity of interests and rationalities surrounding the experience, divergent and convergent considerations and evaluations were expressed by the actors (Figure 4).

The evaluations of the process (Figure 4) showed two types of results. On one hand, there are agreements on the positive aspects of the restoration process towards the recovery of the basin and its significance in terms of participation and stakeholders’ articulation in the highly controversial and fragmented territories. On the other hand, there are disconformities and considerations concerning the procedures and operation of relationships, which come from complex hierarchies and historically controversial contexts that had to be mediated during this governance space. In sum, all interviewed stakeholders agree that this documented restoration experience involved great learning and set a milestone for the future of ecological restoration in the territory.

4.3. Restoration practices as a re-commoning process

The Restauradoras de Nahuelbuta Cooperative is formed by 12 members, seven women, and five men. In terms of leadership, the women are the ones who sustain the organisation, define the agenda, and establish the commercial linkages. This has had positive results in their economic autonomy and self-esteem. The board of directors is composed of one president, one secretary, and one treasurer; all women, except for the manager who in practice acts in subordination to the board. This administrative team carries out much of the development and coordination of commercial agreements. Also, there is a vigilance commission, whose job involves monitoring restoration processes and assuring the fulfilment of commercial commitments. This possibility of self-determination as a group and the capacity to build a formal organization allowed this group of neighbours to evaluate themselves as relevant change agents within the territory. From this position, they could build common senses and strategies for collective action to recover the waters and protect nature.

Following this, the Restauradoras de Nahuelbuta Cooperative principally restores native forest and produces native plants (Figure 5). The first of these activities were carried out on forestry company lands that had previously been monoculture plantations of pines or eucalyptus. The Restauradoras de Nahuelbuta Cooperative was contracted to perform natural ecosystem restoration via native species reforestation. The production of native plants was carried out on an individual basis and through various techniques such as transplanting, cutting, bare-root cultivation, and direct seeding. The main native tree species produced by the cooperative included: coigue (Nothofagus dombeyi), canelo (Drimys winteri), manío (Podocarpus saligna), ulmo (Eucryphia cordifolia), luma (Amomyrtus Luma), lingue (Persea
lingue), maqui (Aristotelia chilensis), and arrayán (Luma apiculata). To a lesser extent, the Restauradoras de Nahuelbuta Cooperative also produces bushes, flowers, ferns, and medicinal plants. With this, they aim to supply themselves with ornamental plants that can be sold to forestry companies, greenhouses, or private individuals and restore and propagate endangered species.

For the Restauradoras de Nahuelbuta Cooperative, the development of these practices has generated a process of rapprochement with nature and renewed their ecological consciousness. Following this traditional knowledge along with training in ecology, botany, and forestry management, all their work is done based on sustainability principles. Seeds were gathered from wild trees and germinated in nurseries...
using only natural fertilisers. Both the production of seedlings and reforestation of native species required a specific set of practices that depend on seasonal and climatic conditions. To address this, the Restauradoras de Nahuelbuta Cooperative made annual work plans that must perform to meet their commercial goals (Table 3). Other sporadic activities such as pole production for living fences, participation in talks and workshops, and promotional activities were made. The training of other groups was not limited to a specific range of dates but depended on the contingency and made up another part of the regular organisational work agenda.

Most Restauradoras de Nahuelbuta Cooperative members built greenhouses in their homes to grow and store the plants to protect them from sun and snow. When an order for plants comes in, the board of directors organises plant collection according to the number of species that each member/owner has in their possession. Next, a location is chosen to stockpile the plants and where the buyer will pick up the order. Finally, after the payment, the money is divided according to the number of plants each member/owner contributed. The plants’ height determines the price. Plants at least 30 cm tall predominated, fetching 1,000 Chilean pesos (about US$1.30). Over the years, three forestry companies have become the main customers of the Restauradoras de Nahuelbuta Cooperative, and they have carried out restoration jobs for two companies, restoring 30 ha and selling about 20,000 plants. Today, within the framework of

Table 3. Annual activities of the Restauradoras de Nahuelbuta Cooperative (Restauradoras de Nahuelbuta Cooperative).

| Activities                                  | J | F | M | A | M | J | J | A | S | O | N | D |
|---------------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| Seed collection                             | X | X | X |    |    |   |   |   |   |   |   |   |
| Hazelnut collection                         | X | X |    |    |    |   |   |   |   |   |   |   |
| Reforestation of native species             | X | X |    | X | X |    |    |   |   |   |   |   |
| Plant cleaning                              | X | X |    |    |    |   |   |   |   |   |   |   |
| Gathering/production of plants (all techniques) | X | X |    |    |    |   |   |   |   |   |   |   |
| Plant watering                              | X | X |    |    |    |   |   |   |   |   |   |   |
| Direct germination                          | X | X |    | X | X |    | X |   |   |   |   |   |
| Nursery and greenhouse improvements         | X | X |    | X | X |    | X |   |   |   |   | X |

Note: From Mendoza Leal (2018).
an agreement established with Company 2, the Restauradoras de Nahuelbuta Cooperative - with the technical and material support of the company – is finishing the implementation of its first collectively-made and owned nursery, which will allow them to grow a greater volume of plants.

Consequently, this whole process of joint work and interaction with the forest recalled memories of the historical relation they had had with the forest, making them remember the many resources they have lost as well as the community connections around the forest:

No one forbade [entrance to lands] because we were a community, many friends or neighbours or in my case in … my land there was a scrubland a *mallín* and there was a lot of Chilean rhubarb and we invited each other with the neighbours, there was cooperation in work, cohabitation and one got together with that neighbour and another and 3 families went and got on collecting rhubarb and we got on a wagon and we went to Purenén to sell and now that does not exist. (Restauradoras de Nahuelbuta Cooperative – Informant 11).

This trip from the past to the present allowed the protagonists of this process to re-value their relationship with the forest and the social and community ties. This was evidenced through regularity and systematised cohabitation in the organisational tasks of their group and their restoration work:

We haven’t had a group like this … relating to many people, with a group, mostly women and share other things that were not only in the school or rural health clinic, but sharing other experiences, we sometimes shared food together so … we had a great time. (…) Women in rural towns don’t go out, they work, work, and work, only the house. In the country, some people think that there isn’t a lot of work, but it’s very envying so the woman does not have her own space. And that was something we did, we got together, talk about everything. Friendships were born … (Restauradoras de Nahuelbuta Cooperative – Informant 2)

In summary, in their analysis of the restoration process and constitution of the cooperative, Restauradoras de Nahuelbuta Cooperative members identify their relevance through the following actions: i) recognise the importance of their job in the restoration of a deteriorated territory under constant forest expansion pressured, ii) identify the need to continue with the process considering current and future ecological needs, iii) renovate their commitment with water protection through the local economy that has traditionally reproduced via the native forest, iv) recognise the need to overcome atomisation and segregation to move towards the visibility of their rural identity that demands social and ecological justice. Based on these criteria, the integrative sense of ecological restoration conceived by the communities and the women who restore can be expressed. Empirically observing this integrative sense allows us to state that the restoration experience can also be a re-commoning experience.

5. Discussion

The global paradigm of sustainable forestry management has integrated biodiversity conservation into the model of large-scale extractive production. As part of the process of economic and cultural globalisation, the expansion of this model has modified the social settings for restoration. From an anthropological perspective, we can say it is a socioecological system wherein self-subsistence economies intersect with the global capitalist economy. The former defends the right to protect resources to sustain life in the territory, following the paradigm of environmental justice (Schlosberg 2007). The latter defends the right to control resources to capitalise on them in global markets, under the principles of the sustainable forest management paradigm (Siry et al. 2005).

Within this, the restoration paradigm expanded its limits beyond a pure expert matter and towards one including the participation of local communities as a critical aspect of the process. Therefore, restoration processes are not exclusively the responsibility of specialists; rather, they are responsible for a network of actors that converge around a common objective (Gross 2006). This type of process, impelled in Nahuelbuta, corroborates that restoration should be social labour linking various territorial actors and that it can be a common goal for social actors of divergent interests.

According to the case study, the diverse interests that emerged from the restoration are part of the local scenery of strain in the territory. Specifically, restoration of natural forest implies the reduction of forest monoculture, which means negative consequences for some and potential benefits for others. For instance, the constant need to pressure forest companies by the Restauradoras de Nahuelbuta Cooperative to carry out restoration processes to recover the basin caused such a level of strain on the cooperative that affected their organisational capacities. In sum, pressure has a specific meaning for each actor. The Restauradoras de Nahuelbuta Cooperative sees it as a forced relationship that they have had with the companies; the companies use pressure to minimise conflicts and continue with their business, and other actors use pressure to legitimise their political demands in the territory.

On the other hand, the case studied reveals that restoration processes coordinated among multiple actors require careful planning which pays attention to the multiple interests and sensibilities in play. In this sense, the restoration experience here studied exemplifies a possible mode of governance, one in which local communities can play an active role in
restoration that is compatible with their peasant economies. Certified forestry companies have played what amounts to a minor role, but one that has served to guarantee restoration areas’ permanence. This has enabled a type of governance that brings visibility and support to the popular goal of restoring ecosystems based on a principle of the common good.

When based on the conception of the watershed as a common, restoration acquires a much more relevant relationship with governance processes (Reyes et al. 2020). In contexts marked by cultural diversity and economic inequality, processes aimed at restoring socio-ecological systems are key initiatives for strengthening and expanding social capital, grassroots leadership, local knowledge systems, and good governance (Budiharta et al. 2016). That means that restoration can be a social and political negotiation space between local socio-ecological systems and multinational systems. In the latter, participation implies sharing perceptions regarding how the socio-ecological system is managed and guaranteeing consensus spaces that respect different views and knowledge regarding the forest (Stringer et al. 2006). Incorporating these elements and the inclusion of all interested local actors in the spaces that govern restoration is crucial for establishing socially and ecologically successful programs.

This case study has allowed us to observe that socio-ecological systems’ sustainability depends, to a considerable degree, on the quality of relationships among interested social actors in a watershed. The watershed can achieve greater sustainability if these relationships are supported by formal agreements that satisfy the multiple needs of the parties involved. This includes the strengthening of restoration as an ecological and economic initiative, which favours access to income for women and their families, something that did not happen before. In practical terms, while mutually respected agreements mediate relationships between the Restauradoras de Nahuelbuta Cooperative and forestry companies, restoration initiatives can proceed, and socioecological goals can be met. However, if one actor does not fulfil its agreements, the relationships’ quality is jeopardised, along with the sustainability of the initiative. In this case study, the initiative was weakened due to the constant need to pressure the other party, the discontinuity of work with Company 1, and the decline in reforestation task demand. This situation decreased cooperative members’ motivation and led to some of them departing, which led to an organisational weakness on which the Restauradoras de Nahuelbuta Cooperative is working. Despite the preceding situation, it is important to note that the Restauradoras de Nahuelbuta Cooperative continues to work on plants’ production and sale based on formal and informal agreements with Companies 2 and 3, respectively. Likewise, commercial relations fluctuate between higher and lower moments, and new dialogues are open for future agreements.

6. Conclusions and recommendations

Most of the scientific and social relevance of our study case is due to the inclusion of the community in the restoration process carried out in the ‘Cordillera de Nahuelbuta’ on private forestry company lands. In this sense, the Restauradoras de Nahuelbuta Cooperative not only represents an unprecedented organisational experience of community-led restoration work and all the implications. It also represents the involvement of a community that has directly experienced the destruction of its native habitat, its replacement by large-scale tree monocultures, and the consequences of this process on their territory and well-being. Therefore, this case represents a re-commoning process that has fostered the progressive recovery of community relations through the practice of producing native plants and reforesting local lands, promoting conservation-minded attitudes and a renewed awareness of the forests’ importance.

Articulated initiatives between public, private, and community actors should include, on the one hand, economic transactions and, on the other hand, recovery of shared spaces. They should consider the economic and political dimensions involved in each case. Considering this complexity, if the set of elements that come together in restoration as a common-good initiative are not considered, it could be limited to commercial agreements, hence jeopardising re-commoning processes. This is especially important when restoration forces a critical relationship between the hegemonic paradigms of sustainable forest management in conflict with the territorial principles of environmental justice, as in this case.

The restoration case as the re-commoning process described in this article demonstrates that socioecological systems are dynamic due to the tensions produced between actors and their disputes over resources. Here, restoration emerges as a response to social pressure. In this sense, we can conclude that restoration processes that involve varied actors – with the characteristics of the case study- are subjected to constant pressure from the beginning and throughout its development. These are pressure-based governance systems since they are based on creating links between socio-ecological systems and diverse and adverse rationales regarding the relationship and use of the resources. This is intensely aggravated by the contemporary situation of global climate and water crises. In this context, interrelationships between humans and nature should be considered when designing more just and effective social and ecological processes.

Current governance requires more attention and support from public organisms with the capacity for diverse social actors to achieve articulation, where
they can make decisions and form agreements recognizing their different interests. The sustainability of restoration and environmental conservation projects responds to specific contexts. Therefore, their planning should consider the diversity of social actors and interests contending, in each case, for resource access and control. The sustainability of socioecological systems formed around contested resources is increasingly demanding for the multiple actors involved. They are dealing with socio-environmental processes which require extraordinary efforts to organise willing and active collaboration, with a particular focus on sustaining their governance platforms. In this context, more scientific research should be carried out that reveals the various dimensions of socioecological systems and that, from a methodological and ethical-political perspective, continues advancing toward a dialogue between different styles of knowledge. Research should proceed according to contemporary interdisciplinary and intercultural scientific practices (De Sousa Santos 2012), addressing restoration from a network of plural, evenly considered, and deliberative knowledge.

Notes

1. Who is also a member of the Tourism and Conservation of Biodiversity project 16PER 66853 of the Chilean Economic Development Agency (CORFO in Spanish) carried out in the territory between 2016 and 2019.

2. We will refer to the companies with the correlative numbers 1, 2 and 3 according to their order of involvement with the initiative.

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## Appendix

### Table A1. In-depth interview guidelines for different actors involved in the initiative.

| Topics                                                                 | Sub-topics                                                                 | Guiding questions                                                                                                                                 |
|------------------------------------------------------------------------|----------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Restauradoras de Nahuelbuta Cooperative (active and non-active members) | Personal background                                                       | • What do you do for a living? What about your family?                                                                                           |
|                                                                        |                                                                            | • How long have you lived in Pichihuenucoye?                                                                                                    |
| Restauradoras de Nahuelbuta Cooperative organisation                   | Structure                                                                    | • What is the cooperative?                                                                                                                       |
|                                                                        |                                                                            | • How do you organise the experience?                                                                                                            |
|                                                                        |                                                                            | • Does it have a determined organisation structure? What is your role in this structure?                                                        |
|                                                                        | Operation                                                                    | • How do you think the cooperative has worked through the years?                                                                               |
|                                                                        |                                                                            | • Which benefits has being part of this experience brought to you?                                                                             |
|                                                                        | Trajectory                                                                | • What activities have you carried out? (enumerate)                                                                                              |
|                                                                        |                                                                            | • In terms of the cooperative, what are your projections?                                                                                       |
| Activities and practices associated with restoration initiatives       |                                                                            | • Which steps or activities must be developed to restore?                                                                                       |
| Relationship with other actors                                         | Within the restoration initiative                                         | • Which actors are related to the cooperative?                                                                                                   |
|                                                                        |                                                                            | • How do you determine the restoration areas?                                                                                                |
| In territorial spaces of governance                                    |                                                                            | • Is this initiative connected to another organisation in the local, regional or national territory?                                               |
|                                                                        |                                                                            | • Does it have any other relationship with other cooperatives?                                                                                 |
|                                                                        |                                                                            | • Do they participate or converge in some spaces related to the native forest or ecology?                                                       |
| Speeches, interests, and motivation to be a part of the restoration    |                                                                            | • Why is the restoration or Restauradoras de Nahuelbuta Cooperative in Pichihuenucoye?                                                          |
| initiative                                                             |                                                                            | • Why do you think the forestry companies are restoring? Has this happened before? Has this been claimed before?                                 |
| Assessments of the forest development and native forest               | Assessment and meaning associated with the native forest                   | • How have you related to the native forest?                                                                                                    |
|                                                                        |                                                                            | • Does the native forest have a role in your family economy?                                                                                     |
|                                                                        | Assessment about the forest development and landscape variations           | • What have been the main changes the native forest has experienced in this place?                                                             |
|                                                                        |                                                                            | • How do you assess the development of the forestry industry in the territory?                                                               |
| Forestry companies (representatives and companies’ technical advisors)  |                                                                            | • How long have you worked for this company? Specificially, what is your job in this company?                                                     |
|                                                                        |                                                                            | • What is your operation area? What is your activity in these areas?                                                                            |
| Articulation with the restoration initiative                           | Activities and practices associated with the restoration initiatives       | • Could you describe the activities that the cooperative has developed?                                                                         |
|                                                                        |                                                                            | • How are the activities that you do with the cooperative designed and developed?                                                             |
|                                                                        |                                                                            | • How important were collective claims and local knowledge during the process of identifying the places for the restoration?                     |
|                                                                        | Types of articulation with the initiative                                 | • What was the motivation to work with the local people?                                                                                         |
|                                                                        |                                                                            | • When the cooperative was built, how did you help in this process?                                                                           |
|                                                                        |                                                                            | • During the trajectory of the restoration initiative what has been your work with the cooperative?                                           |
| Restoration knowledge and operation within the company                 |                                                                            | • When and why did the interest in restoration begin?                                                                                        |
|                                                                        |                                                                            | • How are these restoration plans designed? Who designed them?                                                                                 |
|                                                                        |                                                                            | • Regarding the restoration requirement of the FSC, has how the restoration progressed with the forestry companies?                             |
| Assessment of native forest, restoration, and forest development      |                                                                            | • How have you related to the native forest?                                                                                                    |
|                                                                        |                                                                            | • What does restoration mean to you?                                                                                                           |
|                                                                        |                                                                            | • What is your opinion on the forestry development in Chile and the territory?                                                               |
| Assessment in the restoration process and participation in governance  |                                                                            | • How do you assess the restoration process carried out by the forestry companies and the Restauradoras de Nahuelbuta Cooperative?            |
| spaces.                                                               |                                                                            | • What and how are the spaces where restoration actions are discussed?                                                                        |
| Other actors (NGO advisors and local actors)                          |                                                                            | • Guiding questions                                                                                                                             |
| Topics                                                                |                                                                            | • What do you do for a living?                                                                                                                   |
|                                                                        |                                                                            | • How long have you been doing it?                                                                                                               |
|                                                                        |                                                                            | • As a representative of the organisation, community, or foundation, what are your interests? What are your personal interests?                  |
| Articulation with the restoration initiative                           |                                                                            | • How did you become a part of the restoration initiative?                                                                                  |
|                                                                        |                                                                            | • How do you assess the development of this work?                                                                                               |

(Continued)
| Topics                                                                 | Sub-topics                                                                 | Guiding questions                                                                                                                                 |
|----------------------------------------------------------------------|---------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------|
| Consultancy work with the Restauradoras de Nahuelbuta Cooperative    |                                                                           | • What has your work with the Restauradoras de Nahuelbuta Cooperative been? Can you describe the activities that you have developed with the Restauradoras de Nahuelbuta Cooperative? |
| Assessment and meaning attributed to the native forest and forestry development |                                                                           | • What is your relationship with the native forest? • What have been the main changes faced by the native forest? • What is your opinion on forestry development in Chile and the territory? |
| Assessment in the restoration process and participation in governance spaces. |                                                                           | • How do you assess the restoration process and the work done by the forestry companies and the Restauradoras de Nahuelbuta Cooperative? • Do you participate in any organisation or space where forest development is discussed? |