Chapter 15
Looking Beyond Ecosystem Services Supply: Co-production and Access Barriers in Marine Ecosystems of the Chilean Patagonia

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Abstract In this chapter, we propose a framework of analysis based on the ecosystem service cascade model, to describe and explore the distribution mechanisms of ecosystem services (ES) and their benefits and to inquire into the processes of co-production, capture and access to benefits. As a case study, we selected the Magallanes region in the southern Chilean Patagonia. We mapped five ES: sense of place, food from aquaculture, recreational opportunities, food from artisanal fisheries, and education and knowledge opportunities. For each ES, we determined the number and location of direct and indirect beneficiaries using the Final Ecosystem Goods and Services Classification System (FEGS-CS). Each ES showed a distinctive pattern of supply distribution, and most of the marine space presented low to very low values in all indicators. The areas where ES indicators increased corresponded to small areas and did not necessarily overlap, suggesting few spatial positive and negative synergies between ES. This dispersed distribution of the ES did not coincide with the highly concentrated locations of direct and indirect beneficiaries in the four cities of the region. Moreover, a large part of the ES supply were captured by foreign entities, either by foreign companies in the case of food from artisanal fisheries and aquaculture or by extra-regional beneficiaries in the case of

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recreation and education and knowledge opportunities. The analysis of co-production and access mechanisms evidences that past policies have favored a pattern where the regional population is deprived of accessing the direct benefits of these ES through consumption, enjoyment, or learning. Instead, the benefits that they receive are restricted to employment (sometimes low-quality employment such as at fish processing plants) and income. A better distribution of benefits requires deep transformations of preceding policies and institutions, which not only defined the concentration of people in certain territories but also defined the access mechanisms and power relations that determine who access ES benefits and who does not.

Keywords Marine ecosystem services · Off-site effects · Ecosystem services flows · Access barriers · Distributive inequality · Chilean Patagonia

1 Introduction

Marine systems provide multiple and varied ecosystem services (ES) on which much of the world's population depends (Worm et al. 2006). Although the ES concept has proliferated in the scientific and practical fields, it has had little application to marine ecosystems (Arkema et al. 2015; Townsend et al. 2018; Martino et al. 2019). In assessing marine ES, difficulties are encountered in linking ecological functioning and the generation of services (Jobstvogt et al. 2014; Townsend et al. 2018), which can be summarized as (i) integration of ocean depth as another spatial axis of assessment; (ii) complex spatial and temporal dynamics; (iii) nonlinearity of marine ecological processes; (iv) high mobility of resources and people (Hargreaves-Allen 2020); and (v) shortage of ecological, social, and economic data across the vast majority of the world's oceans.

In this context, most marine ES research has focused on mapping service supply (Nahuelhual et al. 2020) as the first level of the ES cascade conceptual framework (Potschin-Young et al. 2018). Although understanding the factors determining supply is an important contribution to marine ES research, the usefulness of the ES concept in decision-making requires going beyond supply, towards understanding the interactions between supply and demand, their spatial relationships, and the relationships between the natural and social system.

In this sense, little has been studied about the role that societies and institutions have in the production, distribution, and governance of ES and the benefits they provide (Bennett et al. 2015; Rova and Pranovi 2017; Martino et al. 2019). Thus, large gaps in the assessment of ES remain, especially in marine systems. As explained by Bennett et al. (2015), we still do not have a deep understanding of (i) the co-production of ES, understood as the specific social and ecological interactions that enable service generation (Fischer and Eastwood 2016); (ii) the factors driving preference distribution and access to ES benefits; (iii) stakeholder diversity, potential social conflicts, and inequities arising from access to specific ES; and (iv)

issues such as how and when existing governance structures prevent or enhance access to ES benefits (Ruckelshaus et al. 2015).

In this chapter, we propose a framework of analysis to describe and explore the distribution mechanisms of ES and their benefits. Using the framework, we investigate the processes of co-production, capture, and access to benefits, accounting for the spatial relationships between ES supply and capture, based on existing frameworks.

The proposed framework of analysis can serve as an input for (i) identifying the diversity of beneficiaries and asymmetries among them (Felipe-Lucia et al. 2015; Laterra et al. 2019a); (ii) raising awareness among groups based on knowledge of the direct and indirect benefits generated by marine ecosystems (Schirpke et al. 2014); and (iii) identifying the barriers to access the benefits from ecosystems mainly by the most vulnerable groups.

In order to apply this framework, we selected five ES, namely, sense of place, food from aquaculture, recreation opportunities, food from artisanal fisheries, and education and knowledge opportunities. We based our analysis on the Magallanes region in the southern Chilean Patagonia, since this study area is a particularly relevant case for understanding access to ES. Firstly, its naturalness and vastness inspired naturalists and adventurers (Rozzi et al. 2019) and more recently an exclusive mass tourism with special interests in nature (Rozzi et al. 2010). Secondly, it is a region of long-standing conflicts in the use of the marine and coastal space, such as the conflict between canoe peoples who inhabited the marine and coastal areas (Kaweskar and Yaganes) and the foreign powers that plied the Strait of Magallanes (Gleisner and Montt 2014). Finally, given its geopolitical location, the development of the area has been permanently driven by foreign capital to the detriment of local capital (Harmabour 2019).

2 Methods and Data

2.1 Study Area

The Magallanes region and Chilean Antarctica is the most extensive and the second least populated of the Chilean territory. It extends between 53°09 and 70°55 SL and marks the southern limit of Patagonia and the American continent. According to the 2017 population census, it has 164,661 inhabitants who are concentrated in the cities of Punta Arenas, Puerto Natales, Porvenir, and Puerto Williams. Its creation as a region dates back to 1978, and its final boundaries were drawn in the twentieth century (Supreme Decree 2339/YEAR). The territory was historically inhabited by the Kaweskar, Yagan, Tehuelches, and Selknam peoples, for thousands of years. However, the occupation of Patagonia and the advent of sheep farming in the years 1880–1920 from Europeans led to the genocide and acculturation of these people almost leading to their extermination (Harambour 2017).

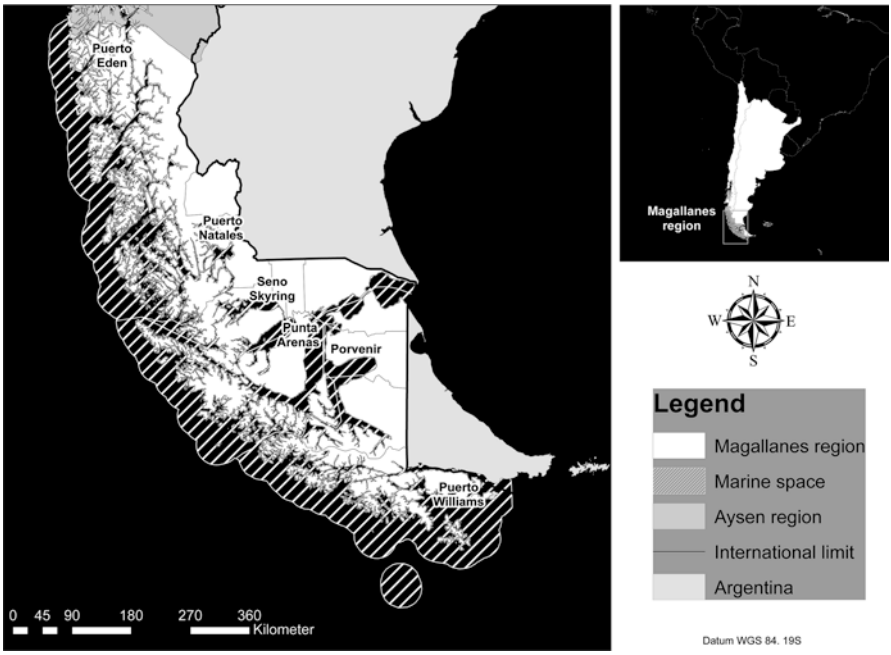

Fig. 15.1 Study area in the Magallanes region, Chilean Patagonia

Currently the region has an economy focused on commodity exports. The main activities are cattle raising, the exploitation of hydrocarbons, the salmon industry, fishing (industrial and artisanal), and tourism (Fig. 15.1).

2.2 Framework of Analysis to Explore Mechanisms of Appropriation, Co-production, and Access to Ecosystem Services Benefits

We built our analyses on the ES cascade framework (Potschin-Young et al. 2018), where a "service production chain" is represented. We start with the biophysical structures and processes of the ecosystems and end with the social benefits that society obtains (Liquete et al. 2013). The cascade framework has been enriched by incorporating new interactions mainly allusive to the relationships between social and biophysical systems (Spangenberg et al. 2014; (Felipe-Lucia et al. 2015). The adapted framework (Fig. 15.2) allowed us to explore the relationships of co-production of ES, the mechanisms of access to benefits, the migration of ES flows, and the impacts of these relationships and flows.

We defined each of the elements in Fig. 15.2 as follows:

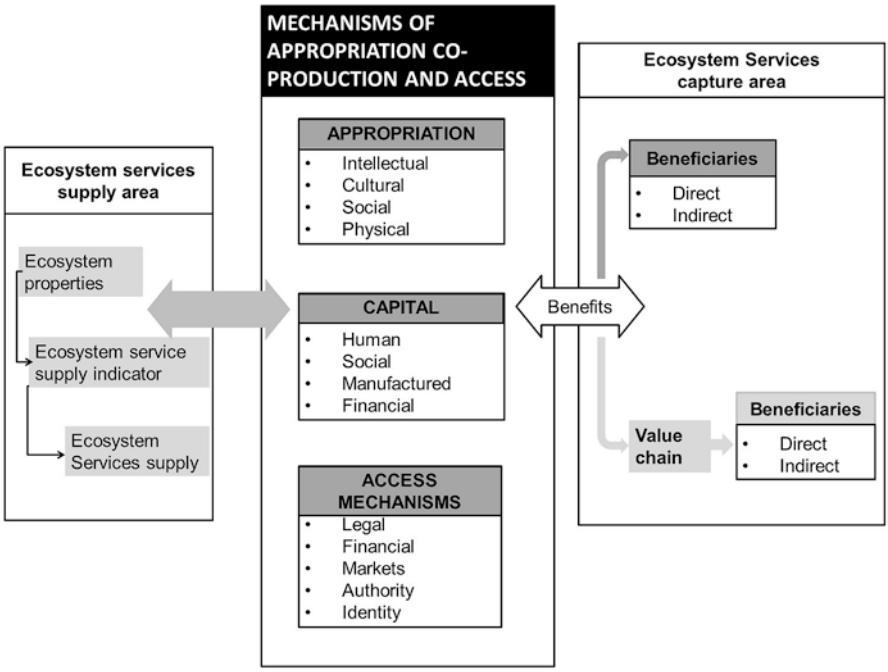

Fig. 15.2 Analysis framework to explore mechanisms of appropriation, co-production, and access to ecosystem services benefits. (Modified from Felipe-Lucia et al. 2015)

(i) *Ecosystem services supply areas*: Ecosystem service supply is defined as "the ability to provide a specific package of ecosystem goods and services within a specific spatial extent and temporal duration" (Burkhard et al. 2012). A supply area is defined as the space in which a certain supply accrues and is usually represented by ES supply hotspots.

(ii) *Mechanisms of co-production and access to ecosystems*: They allow us to understand the contributions of different forms of capital (human, social, manufactured, and financial) to the supply of ES and the capture of benefits by human beneficiaries (Cook et al. 2020). Ownership mechanisms, for example, are understood as forms of capturing, transferring, transforming, processing, and/or providing the services to generate ecosystem benefits, which require investments of time, labor, resources, technology, and money as a means to make them available (Braat and De Groot 2012). In addition, goods and services from ecosystems enter value chains of economic activities that are linked at the local level (Laterra et al. 2019b). On the other hand, access to benefits from ES is affected by a network of formal and informal institutions and policies (Scoones and Wolmer 2003).

(iii) *Area of capture of ES and benefits*: A capture area is where ES supply (totally or partially) reaches a human beneficiary and generates a direct or indirect

benefit. Supply and demand for ES are often spatially uncoupled (Hein et al. 2016; Brauman et al. 2007; Vergara et al. 2020). Benefits are understood as positive changes in well-being given the fulfillment of needs and desires (TEEB 2010). Beneficiaries are defined as any group of people who benefit from ES through active or passive consumption or through recognition resulting from knowledge of these services (Nahlik et al. 2012).

2.3 *Assessment of Ecosystem Services Supply*

The evaluation of ES supply relied on ad hoc indicators based on the literature, the particularities of the study area, and the availability of information, and expert judgment (Table 15.1). We quantified and mapped five ES: (i) sense of place; (ii) food from aquaculture; (iii) recreational opportunities; (iv) food from artisanal fisheries;

Table 15.1 Ecosystem services supply indicators and their variables

ES	Description	Spatial attributes
Sense of place	It reflects the emotional bond with a place, created through direct interaction between humans and places (Kaltenborn 1998)	Iconic marine species
		Special lasting places
Food from aquaculture	Quantity of fish extracted from mariculture units, measured as biomass (kg km^2). The main species cultivated in the region are coho salmon, salmon, and rainbow trout, which represented 100% of the regional harvest in 2018	Annual productivity
Recreation opportunities	Capacity of marine and coastal areas to support tourism and recreational activities	Accessibility
		Scenic beauty
		Capacity for tourist use
		Unique natural resources
		Cultural sites
Food supply from artisanal fisheries	It reflects the amount of fish extracted from the marine area of the artisanal fishery, expressed as biomass (kg km^2). Information is included on five artisanal species of regional importance, which together represent 67% of landings in 2018 (SERNAPESCA 2019): spider crab (*Lithodes santolla*), sea asparagus (*Ensis macha*), scallop (*Austrochlamys natans*), conger eel *(Genypterus chilensis*), and sea urchin (*Loxechinus albus*)	Fishing area of each species
		Landings
Education and knowledge opportunities	It reflects the amount of research carried out in the region	Number of publications
		Research effort

and (v) education and knowledge opportunities. The selection and weighting of variables to be included in each indicator were made based on a bibliographic review and expert judgment. The variables selected for each indicator were spatially processed using Geographic Information Systems (GIS) (see Vergara et al. 2020 for details on indicator construction and supplementary material within).

2.4 Benefit Assessment

We adapted the Final Ecosystem Goods and Services Classification System (FEGS-CS) developed by the US-EPA (Landers and Nahlik 2013), which is a two-part classification system composed of (i) the identification of ES and (ii) the identification of an explicit human beneficiary of these specific goods and services. Direct beneficiaries are defined as those who directly use, consume, and/or enjoy the benefits of the ES, while indirect beneficiaries are those that benefit through the generation of employment and wealth (Daw et al. 2011).

A review of information was carried out for the representation of beneficiaries. The main source of information was the databases of the Internal Revenue Service (SII 2019), where workers are reported by company and economic category. In many cases, direct data is not available, and potential beneficiaries can only be estimated using spatial information and statistical information available at the municipal level, such as population censuses (Schirpke et al. 2014). A description of each type of beneficiary for each ES can be found in Vergara et al. (2020).

2.5 Co-production and Access to Ecosystem Services

Human intervention in ecosystems has been the fundamental factor driving the supply and distribution of ES in the Anthropocene (MEA 2005). People protect, conserve, use, challenge, alter, exploit, destroy, change, and rehabilitate ecosystems, consciously and unconsciously, for their own benefit or that of another person, with implications for ecosystem functions and services (Bennett et al. 2015). The analysis of co-production and access mechanisms relied on the questions in Table 15.2. This description was based on a literature review, expert knowledge, and government newsletters and information.

Table 15.2 Key questions to explore the co-production of and access to ecosystem services

Co-production mechanisms	
What are the mechanisms governing the co-production of the ecosystem service?	Appropriation When does nature become an ecosystem service?
	How are ecosystem services captured, transformed, transported, and processed in order to generate ecosystem benefits?
	Entering the value chain How does the benefit enter the network of relationships or links that aim to bring the greatest possible value to the benefit?
Access mechanisms	
How do access barriers to capture ecosystem service benefits operate?	Rights-based access (legal) What legal mechanisms operate to restrict access to beneficiaries?
	Access to financial capital What financial mechanisms operate to restrict access to beneficiaries?
	Access to market What market mechanisms operate to restrict access to beneficiaries?
	Access to authority What governance mechanisms operate to restrict access to beneficiaries?
	Access through social identity What cultural and identity mechanisms operate to restrict access to beneficiaries?

3 Results

3.1 Ecosystem Service Supply Areas

Figure 15.3 and Table 15.3 show the distribution of ES supply in Magallanes region and the percentage and area (km^2) by value category. Sense of place showed low to medium values of the indicators (measured in normalized values from 0 to 100) across most of the region (Fig. 15.3, panel A). The areas of higher indicator values concentrated in Cape Horn, in Navarino Island. This is due to the concentration of attributes like the presence of emblematic species such as leopard seal *(Hydrurga leptonyx*), southern elephant seal (*Mirounga leonine*), and black-browed albatross (*Thalassarche melanophris*) and areas with indigenous toponymy. The areas of provision of food from aquaculture concentrated in Puerto Natales and in Skyring Sound. Both areas hold the most suitable hydrodynamic characteristics, but they have been declared saturated areas for aquaculture (Res. n° 2189). Most parts of the region (97.8%) do not have any supply (Fig. 15.3, panel B).

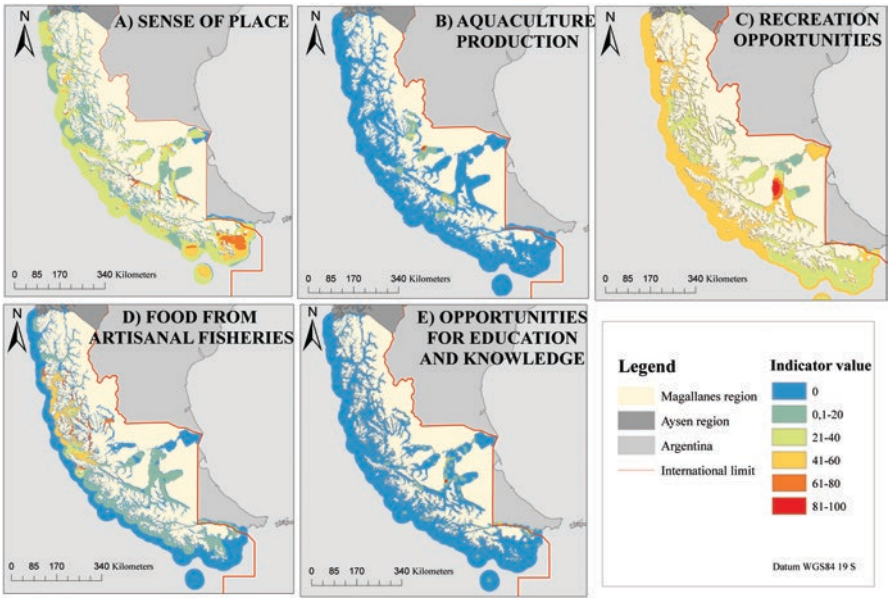

Fig. 15.3 Distribution of the ecosystem services supply indicators in the Magallanes region

The highest values of the recreation opportunities indicator concentrated in the Strait of Magallanes, an iconic place that has high values of accessibility attributes (with consolidated marine routes of international importance), unique natural resources (due to the presence of southern right whale, *Eubalaena australis*, and sei whale, *Balaenoptera borealis*), and cultural heritage. More than 50% of the region's marine area had medium values of the indicator, which makes it the indicator with the largest regional distribution (Fig. 15.3, panel C).

In the case of food from artisanal fisheries, medium, high, and very high values of the indicator (covering 8.5% of the marine area) concentrated in the north of the region, near the towns of Puerto Natales and Puerto Eden. This is explained by the presence of the urchin (*Loxechinus albus*) fishery, which by itself represents 43% of regional landings (Fig. 15.3, panel D).

Education and knowledge opportunities were widely distributed across the region but with only two small areas with high and very high indicator values. The first area is the central section of the Strait of Magallanes, which due to its proximity to the city of Punta Arenas (which groups universities and research centers) becomes an area of easy management and access. The second area was located in the Beagle Channel (Fig. 15.3, panel E).

Table 15.3 Percentage and area of provision of ES by category of indicator value

Indicator value category (ES supply)	Indicator normalized value	Sense of place		Food from aquaculture		Recreation opportunities		Food from artisanal fisheries		Opportunities for education and knowledge	
		km^2	%	km^2	%	km^2	%	km^2	%	km^2	%
No ES flow	0	5.8	0.0	112,020	97.8	5.17	0.0	75,094	65.5	76,108	66.4
Very low	0.1–2.0	23,484.8	20.5	1995	1.7	5551	4.8	27,272	23.8	38,096	33.2
Low	2.1–40.0	73,186.6	63.9	431	0.4	46,647	40.7	2397	2.1	102	0.1
Medium	40.1–60.0	13,476.5	11.8	96	0.1	60,444.63	52.7	7702	6.7	187	0.2
High	60.1–80.0	4307.3	3.8	19	0.0	1064.2	0.9	1866	1.6	0	0.0
Ver high	80.1–100	129	0.1	29	0.0	878	0.8	259	0.2	97	0.1
Total		**114,590**	**100**	**114,590**	**100**	**114,590**	**100**	**114,590**	**100**	**114,590**	**100**

3.2 Benefit Assessment

3.2.1 Beneficiaries in the Magallanes Region (Local Beneficiaries)

Table 15.4 shows the number of direct beneficiaries (DB) and indirect beneficiaries (IB) of ES in Magallanes region and their percentage over the regional population.

In the case of sense of place, the totality of the regional population corresponded to direct beneficiaries. Indirect beneficiaries (508) represent 0.3% of the regional population. The greater percentage of indirect beneficiaries relates to activities of publication of books linked to the marine and coastal territory of the region, followed by the workers of regional museums. Although this ES is distributed throughout the region and the entire population is the direct beneficiary of it, it does not generate significant production chains in the region.

For food from aquaculture, direct beneficiaries (salmon consumers) are 10,656 people representing 6.7% of the regional population. The indirect beneficiaries are 420 people who live in the region and work in the salmon production chain, representing only 0.3% of the population. For recreational opportunities, the beneficiaries are visitors from outside the region who register their visit to national parks. In 2018, 544,523 visits were registered, of which 280,755 were Chilean visitors and 263,768 were foreigners. The number of indirect beneficiaries employed by industries related to tourism and recreation was 7888, which represents 4.9% of the regional population. Food from fisheries had 4441 direct beneficiaries (fish consumers) and 9368 indirect beneficiaries who work as artisanal fishermen or in processing plants and represent 5.6% of the regional population.

Finally, the ES of education and knowledge opportunities had 29,892 direct beneficiaries who were mainly students involved in activities related to the knowledge of marine and coastal areas. The indirect beneficiaries were 2667 people who work in educational institutions. They have access to teaching activities related to marine and coastal areas and represent 1.7% of the regional population.

3.2.2 External Beneficiaries

Figure 15.4 shows the distribution of direct beneficiaries of ES that are exported as products outside the country and/or attract beneficiaries from other parts of the world. The availability of data only allows us to present the external beneficiaries of the ES of food from fisheries, food from aquaculture, and recreation opportunities. Panel A shows the distribution of direct beneficiaries of food from artisanal fisheries. In this case, 39.6% of the ES flow is exported to Japan, where 245,480 people can meet their annual consumption demand for marine products only with what is imported from the Magallanes region. Another 25% goes to China where 163,800 people can satisfy their annual fish demand with these imports. Spain, Taiwan, and the United States are the next recipients of the region's marine and fishing products with exports representing 9.3%, 7.5%, and 3.0% of the region's ES flow, respectively.

Table 15.4 Local beneficiaries of the Magellan region

	Number	Percentage of total population
Population (number of persons[a])	166,533	100.0
DB sense of place		
Native population	1261	0.8
Municipality population[a]	165,272	99.2
Total DB sense of place	166,533	100.0
IB sense of place		
Artists whose work is related to the identity of marine ecosystems	79	0.0
Film producers related to the landscape of seas and fjords	50	0.0
Other cultural activities inspired by the marine and coastal area such as book publishing and other publishing activities	282	0.2
Workers of museums and cultural activities	97	0.1
Total IB sense of place	508	0.3
DB food from aquaculture		
People who can feed with the availability of fish given consumption recommendation	10,656	6.4
Total DB food from aquaculture	10,656	6.4
IB food from aquaculture		
Workers of related aquaculture services	420	0.3
Total IB food from aquaculture	420	0.3
DB recreation opportunities		
Total visitors to national parks[b]	458,447	
Total DB recreation opportunities	458,447	
IB recreation opportunities		
Workers in travel agencies, tour operators, and tour guides	239	0.1
Workers in transportation activities	300	0.2
Workers in tourist hosteling	7349	4.6
Total IB recreation opportunities	7888	4.9
DB food from fisheries		
People who can feed with the availability of fish given consumption recommendation	4441	2.7
Total DB food from fisheries	4441	2.7
IB food from fisheries		
Artisanal fishers	9136	5.5
Workers of related fisheries service	232	0.1
Total IB food from fisheries	9368	5.6
DB education and knowledge opportunities		
Teachers of university and technical careers that can relate to marine and coastal themes	101	0.1
Schoolchildren that are related to marine and coastal knowledge activities	28,880	17.3

(continued)

Table 15.4 (continued)

	Number	Percentage of total population
Researchers who publish on marine and coastal issues located in the Magellan region	91	0.1
Secondary technical education coastal and marine specialties	820	0.5
Total DB education and knowledge opportunities	29,892	18.0
IB education and knowledge opportunities		
People who work at state educational establishments that have access to marine and coastal educational activities	2667	1.7
Total IB education and knowledge opportunities	2667	1.7

[a]Represents the total of the municipalities population subtracting the native population
[b]They are foreign visitors who register entry into national parks; the national tourism service does not record domestic tourism

Panel B shows the destinations of the food from aquaculture service: 27% of the service's flow is exported to the United States where 475,168 people can supply their annual fish consumption demands with the Magallanes region's salmon, followed by Russia with 22% of the exports (395,171 beneficiaries), Japan with 12.0% (207,777 beneficiaries), and China with 8.9% (155,289 beneficiaries). The total number of external beneficiaries of food from aquaculture is 1,726,413 people.

Panel C shows the origin of foreign visitors to the Magallanes region. The largest number of beneficiaries comes from Germany with 9.2% of visitors (21,811 recreationists), France 8.3% (19,696 recreationists), Brazil 7% (16,693 recreationists), and Argentina 6.9% (16,453 visitors). The total number of foreign visitors to Magallanes Patagonia is 237,338 (SERNATUR 2018).

3.3 Co-production Mechanisms

In the case of sense of place, the external factors that contribute to the generation of the service are the social and cultural production and reproduction that influence in the intellectual and affective act of the places that are inhabited (Mora 2012; Gustafson 2001). Food from aquaculture is generated by taking advantage of the ecosystem conditions for the cultivation of aquaculture species, which is achieved by modifying the marine environment through the construction of cage rafts for fish farming (Landers and Nahlik 2013), in this case salmonids, a species introduced into the territory. Recreation opportunities depend on the natural attributes of the region but are modeulated by external factors in the generation of the service, which respond to the information dissemination, ideas, and opinions with the intention of positioning a geographic place that meets the desired attributes for recreation and tourism (Stokowski 2002). Particularly in the Magallanes region, the ES for recreation opportunities is linked to the nature tourism market where its remote location and extreme weather conditions (presence of land and sea ice) have represented

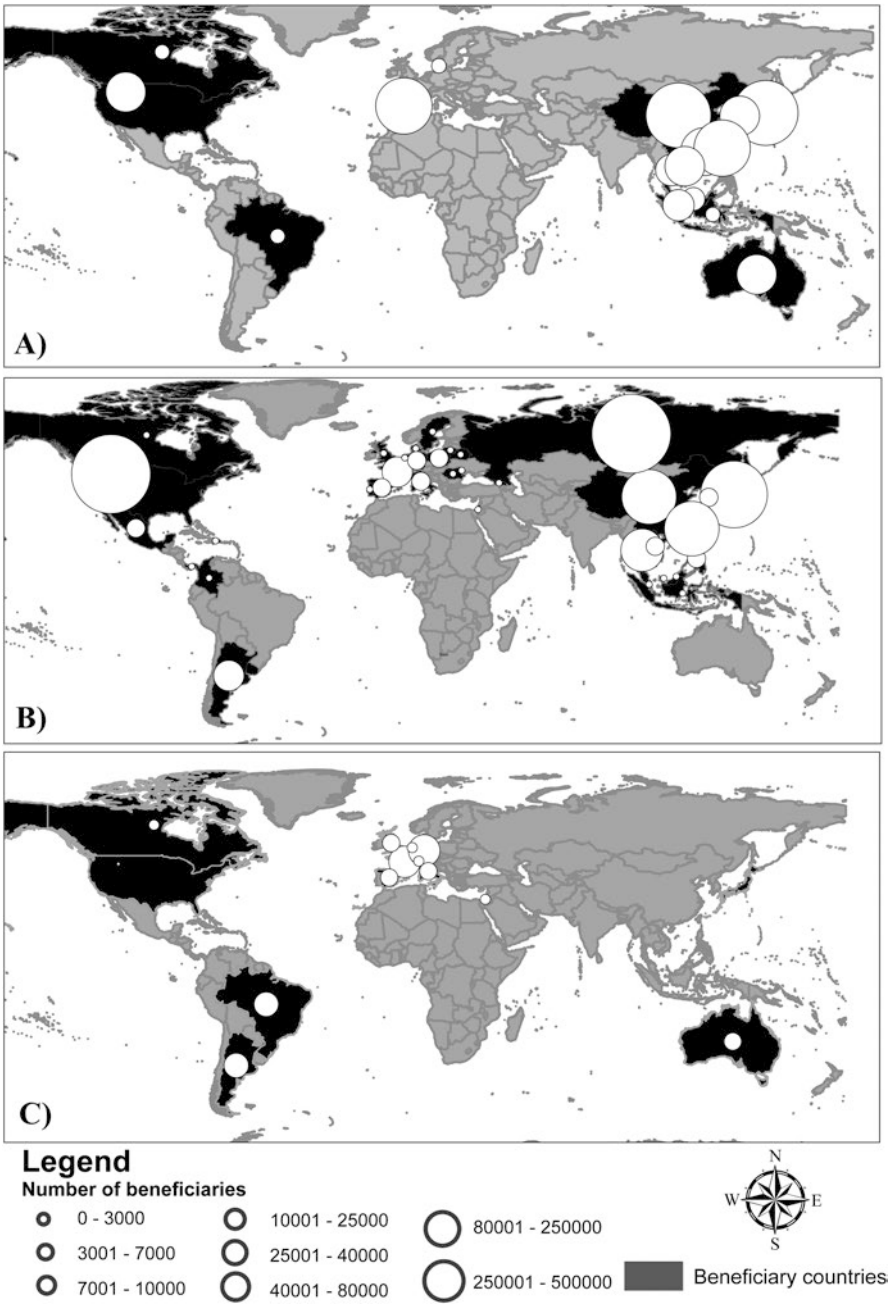

Fig. 15.4 External beneficiaries of food from artisanal fisheries (**A**), food from aquaculture (**B**), and recreation opportunities (**C**)

prohibitive conditions and important limitations for human activity (Lamers et al. 2008). However, the tourism industry began to overcome these limitations, positioning the region through market products using concepts such as nature tourism among others (Hartwell et al. 2012). In the case of food from artisanal fisheries, it is the fishing activity that generates the ES, which is reflected into the capture of fish for human consumption (Anticamara et al. 2011). For the ES of education and knowledge opportunities, nature becomes a service through learning as a result of the interaction with the social and biophysical environment (Alexander et al. 2009).

Direct beneficiaries capture the ES of sense of place, based on the links with identity and belonging to the community (Gallina and Williams 2015), and it is transformed into benefits through artistic expressions for example (Spencer and Werness-Rude 2015). For the capture, transformation, transport, and processing of food from aquaculture, a variety of processes are required such as breeding, fattening, feeding, and processing that depend on specific ecosystem conditions. These processes culminate in the production of food that constitutes the service (García Moreno 2005). In the case of recreational opportunities, the capture of the service is almost exclusively through the tourist market. The tourism companies in the area, based on complex logistics that can reach the Antarctic Region (Lamers et al. 2008), transport the recreationists (direct beneficiaries) to the places where the service is provided. For their part, the indirect beneficiaries (owners, suppliers, and employees of these industries) capture the service from the operation of these companies (Laterra et al. 2019b). In the case of food from artisanal fisheries, the capture is carried out by the fishermen (indirect beneficiaries) using fishing gear that is specific to each species. Fishing takes place in fishing grounds located in fjords and channels, and fish is transferred in fishing boats to the coves. From the coves, the fish is distributed to the direct beneficiaries, which are local and foreign consumers (Castillo 2011). The capture of education and knowledge opportunities is carried out through exploratory and descriptive research of the components of the ecosystem and their relationships, applying different methods. The indirect beneficiaries, on the other hand, make use of the captured knowledge for educational purposes.

For the ES of sense of place, the attributes of marine and coastal locations are catalysts for individual creativity and creative industries (Drake 2003; Clare 2013). The creative industries are integrated in place, where the importance of aesthetics and social networks leads to a narrow geographical clustering (Clare 2013; Gertler 2004). For food from aquaculture, the benefit enters the value-adding network through the global food industry. In the case of recreation opportunities, the ES is transformed into tourist products. Tourist products are characterized by a set of tangible and intangible elements that allow the development of specific activities in certain destinations (Nasimba and Cejas 2015). For ES of food from fisheries, the service enters the network of value addition through the local sale of products and the global food industry. The knowledge coming from the ES of education opportunities suffers a process of value addition, from public and private institutions that are working on programmatic axes of research and formal and nonformal education to improve understanding of the value of ecosystems for the well-being of humanity (MEA 2005; TEEB 2010).

3.4 Access Mechanisms Acting as Barriers to Capture ES Benefits

For the place-based ES, there are at least three mechanisms that restrict or favor access to beneficiaries, all of which are linked to the zoning of marine coastal areas:

(i) Indigenous Peoples' Marine Coastal Spaces. They are a form of spatial property right that favors access to one type of direct beneficiaries of ES and excludes another. It aims to protect ecosystems and native cultures (Zelada Muñoz and Park Key 2013).
(ii) Marine Protected Areas. There are two main categories of marine areas: the first, marine parks, restricts almost all economic uses and access to beneficiaries, and the second, multiple-use marine protected areas, has a flexible framework to design that activities can be developed within your area (such as artisanal fishing).
(iii) Salmonidae Concessions: They function as concessions of marine space where rafts-cages for salmonids are installed. A concession is restrictive in its entry to people not related to the particular salmon farming company.

In the case of the indirect beneficiaries of sense of place service, there is a legal framework that regulates the creative industries. These aspects condition the access to benefits, as they are necessary requirements for its formal development. Within these regulations are employment regulations, health, safety, product standards, antitrust laws, and patent laws, among others. In addition, the creative industries integrate the sectors in which the value of goods and services offered is based on intellectual property (Erickson 2018), a limitation that must be respected by the rest of the indirect beneficiaries.

There are no legal access barriers for the direct beneficiaries of food from aquaculture (salmon consumers). In the case of the indirect beneficiaries of the ES for food from aquaculture, sectorial permits are required for the installation and operation of the plants (SERNAPESCA, Navy, Environment Superintendence, Environmental Impact Evaluation Service). There are no legal restrictions on access to tourism products for the direct beneficiaries of the ES of recreation opportunities. However, for the IB, there is a need for formalization, which implies patent rights, navigation rights, and sectorial permits for access to areas for recreation, among others (Subsecretaria de Turismo 2020).

In the case of the ES for the food from fisheries, the law that regulates the inspection allows sanctioning consumers (direct beneficiaries) that do not respect the control mechanisms of the artisanal fishing specific to each fishery (biological closures, size regulation, and noncompliance with quotas, among others) (Law 21.132, Ministerio de Economía, Fomento y Turismo 2019). Artisanal fishermen as indirect beneficiaries of this service have a legal regulation of access to benefits, through (i) the limitation of fishing licenses (closure of the list of fishermen authorized to operate in a given fishery); (ii) the establishment of fixed fishing quotas; and (iii) regulation by size and closures (SUBPESCA 2020). For their part, the processing plants

must comply with the same standards of reception of fishing products described for the direct beneficiaries, in addition to being regulated in terms of health and trade.

In the case of researchers (direct beneficiaries of education and knowledge opportunities), the activity is restricted by the need to have legal documents such as sectorial permits that allow, for example, navigation, research fishing, and access to certain places, among others (Artigas and Escobar 2001; CONAF 2013). On the other hand, secondary technical education establishments with a coastal and marine specialty (direct and indirect beneficiaries) require legal and administrative procedures to validate their formal educational programs. However, these mechanisms do not restrict access to the benefit, but rather give it a degree of recognition and allow them the necessary funding for its operation (MINEDUC 2011).

No financial mechanisms were identified that restrict or facilitate access to the ES direct beneficiaries of sense of place. However, for some indirect beneficiaries (those linked to the creative industries), access to funding sources is limited, even in the case of activities and projects that have an attractive "expected" private profitability. For food from aquaculture, the direct benefit of the ES is mediated by the capacity to pay for salmonid products. One single kilogram of salmon costs approximately US$15 (FAO 2019), and salmon sales points are concentrated in two cities in the region. As for the workers (IB) of this service, there are no restrictions mediated by financial capital. However, the owners and investors need financial capital for the installation of breeding, fattening, feeding, and processing centers for salmonid products (SERNAPESCA 2001). It should be noted that with the exception of Agrosuper (Chilean holding of food companies), the important capitals of fishing farming are foreign and associated with large investment holding companies such as Legend Holdings Corporation (Lenovo) or Mitsubishi (Irarrázaval and Bustos 2020).

For the direct beneficiaries of recreation opportunities, there is a financial restriction in the access since marine and coastal Patagonian tourism is planned towards foreign markets (Mac-Lean 2010). In Magallanes, 50% of the population has a salary equal to or less than US$620 per month. The value of a tourist cruise in Patagonia starts at US$2000, and a 1-day kayak trip starts at US$150 (EPAUSTRAL 2019). Additionally, from the perspective of the indirect beneficiaries, it is necessary to emphasize that tourism linked to the SE for recreation can have high installation costs.

The tourism promotion programs and the financing lines of the Chilean Development Corporation and the National Tourism Service do not offer capital access programs focused on marine tourism (Subsecretaría de Turismo 2016).

Access to food from fisheries is mediated by the capacity to pay. The average prices of the first transaction of the fish products that make up the indicator are crab, 9 US$ per kg; urchin, 1 US$ per kg; golden conger, 3 US$ per kg; huepo, 0.7 US$ per kg; and scallop, 1 US$ per kg (SERNAPESCA 2019). The prices of sale to the consumer in the established commerce are crab, 50 US$ per kg; urchin, 33 US$ per kg; golden conger, 16 US$ per kg; huepo, 10 US$ per kg; and scallop, 17 US$ per kg. Beyond price restrictions, it is important to emphasize that practically there are

no points of sale of fishing products in the region and they can only be found in the municipalities of Puerto Natales and Punta Arenas.

On the other hand, artisanal fishermen need access to financial capital for the acquisition and maintenance of boats and for their operation. Access to such financial capital is limited by the informality of the activity, whereas state promotion instruments are sporadic and insufficient. This situation means that fishing boat owners usually end up being financed by the processing plants through an authorization contract (Poblete et al. 2013). Beneficiaries who are processing plant workers do not need access to financial capital.

For direct beneficiaries of education and knowledge opportunities, specifically for scientific researchers, financial capacity is a determining factor in conducting research (e.g., fees, sailing campaigns, laboratories, etc.). In general, financial capital is obtained by applying for scientific development funds through the National Agency for Research and Development and is mostly restricted to those with PhD degrees, being a restriction on access to benefits. The existing secondary technical education establishments of coastal and marine specialty in Magallanes region are mostly public, so there is no restriction of access by financial mechanisms to students and teachers related to them.

In the case of the direct beneficiaries of the ES sense of place, there is no market associated that can restrict access to beneficiaries; however, in the case of the indirect beneficiaries, it is the market that regulates who can access the benefits of the service. In this sense, market gaps are evident, which can be summarized in the centralization of purchasing powers, platforms to promote creative industries, and spaces for training, exhibition, and marketing. For the ES of food from aquaculture, the food coming from the aquaculture in Magallanes (salmonids) is oriented towards international markets. This generates two mechanisms of exclusion towards the local consumers: lacking salmonid products in the region and acting synergistically with the financial access barriers through the local prices of the salmon. Regarding indirect beneficiaries of this service, the employees of the salmon plants access the market through their employment, and there are no mechanisms for excluding beneficiaries. On the other hand, investors in processing plants access the market through ProChile's positioning programs (Vera Garnica 2009), the promotion instruments of Fundación Chile, and their own business networks.

In the case of recreation opportunities, there are no market mechanisms that restrict access to the direct beneficiaries; restrictions are rather of price, as already noted in the financial mechanisms. On the contrary, in the case of the indirect beneficiaries, it is important to point out that tourism planning in Magallanes is oriented towards the investment of foreign capital or consolidated national capital, leaving smaller local tourism operators outside the objective image of regional tourism (Collipal Pichicona 2017). In the case of food from artisanal fisheries, artisanal fishermen (indirect beneficiaries) access the formal market only through the sale of marine products to intermediaries or processing plants. Their access is limited by contracts that are previously made through the authorization of boats (Poblete et al. 2013). Processing plant workers access the market through their work. Process plant investors access international markets, thanks to the support of ProChile (state

agency of the Ministry of Foreign Affairs which is in charge of promoting the exportable supply of Chilean goods and services) (Aldunate Wegner 2013).

There are no market mechanisms restricting access to ES beneficiaries of education and knowledge opportunities. In the region, research with a high I + D component is favored through the valorization of the latter in the market. It should be noted that the region's science policy recognizes as an objective "Promoting the application of knowledge and technology in productive activities to increase the competitiveness of the regional productive structure" (Conicyt 2009).

For the ES of sense of place, the existing governance mechanisms do not determine access. However, there has been a demand (recently recognized) from the Selknam people towards the authority for their recognition as a living people, which due to their delay has resulted in a lack of protection of their places of cultural importance. Furthermore, between 2004 and 2010, under Article 23 of Convention 169 of the International Labour Office (ILO) and Article 1 of the Indigenous Law, the Fishing Sub-secretariat of Chile granted quotas for the capture of 60 specimens per year, exclusively aimed to Kawesqar Indigenous Community (Cruz-Rueda 2008).

For the food from aquaculture, the access of direct beneficiaries and indirect beneficiaries is not mediated by access to authority. Nevertheless, the salmon industry after the ISA virus crisis (2016) formed a public-private coalition with the State where the general guidelines of the industry were established. After this the salmon companies that were summoned to the coalition positioned their preferences in the new regulations (Irarrázaval and Bustos 2020).

For recreation opportunities, direct beneficiaries do not face identified barriers to access the authority. However, in the case of the indirect beneficiaries, it is necessary to clarify that the municipalities are administrative nodes with power that in Chile have a central role in the development of tourism. Nevertheless, in Magallanes, the municipalities and their authorities concentrate an unequal political power, and, with some exceptions, they do not have the capacity to be an articulating agent of the development of the marine and coastal tourism in their territory (Valenzuela 2015).

Researchers and research centers (indirect beneficiaries of education and knowledge opportunities) need to position their research topics before local and regional authorities to obtain public funding for their field campaigns; such positioning is done through lobby (Guinovart 2009).

In the case of the ES of sense of place, the access of the direct beneficiaries is mediated by social and cultural identity (Gustafson 2001). For the ES of recreation opportunities, certain groups, such as artisanal fishermen, can access capture areas of this ES through the practice of their occupation, exceptionally being an access not mediated by the tourism industry. In this case, being part of this particular social group facilitates access to the benefits of the service. Likewise, there is a line of financing aimed at strengthening the supply of indigenous tourism products (indirect beneficiaries); however, no native people of Magallanes region has been awarded such financing (Subsecretaría de Turismo 2020). Salmon farming is not culturally rooted in Magallanes, and there is no consumption linked to social identity (Chávez Zúñiga & Milahuichún Mayorga 2011). There are no mechanisms that restrict access through cultural identity.

In the ES of education and knowledge, opportunities and researchers (direct beneficiaries) who belong to groups that have historically been related to the sea (canoeing or fishing villages) may have greater facility to generate knowledge that links different forms of knowledge; an example of this is the scientific work of Jose Tonko (2008), researcher and representative of the Kawésqar people. A similar case occurs with the relation of students and teachers (direct beneficiaries and indirect beneficiaries). Activities related to the sea through family inheritance (such as work in fishing or aquaculture) can favor the learning process (Ávila-Ruiz 2005). In the case of ES of provision of food from fishery, the informal consumption of fishery products may be mediated by the proximity of the consumer to fishermen (Castillo 2011). The access of indirect beneficiaries is not mediated by access to authority.

4 Discussion and Recommendations

In the collective imagination, the southern seas are drawn pristine and devoid of human activity. From the end of the nineteenth century and the beginning of the twentieth century, this romantic idea of Patagonia as the last empty border where everything is possible (Harambour 2019) was spread throughout the global north. This idea of spaces without sovereignties (neither of the nation states nor of other peoples) promoted a logic of free capital flows throughout Patagonia based on the activities of European companies.

The truth is that the southern seas have been populated for at least 11 thousand years (Méndez 2011) and since then humans have used, transformed, managed, and adapted to the sea to co-produce goods and services for their long-term benefits. This co-production has intensified in recent decades because of technology that makes possible the "materialization" of many ES, which would, otherwise, be impossible to capture (e.g., opportunities for education and knowledge). On the other hand, technology has allowed the generation of ES under "semi-natural" or highly artificial conditions, such as the production of food from aquaculture in marine farms.

Understanding the mechanisms that determine how ES are co-produced and how they are distributed goes beyond observing the ecosystem variables that determine ES supply (first stage in the cascade model). Certainly, ES as waste assimilation are represented exclusively by biophysical variables. But others, such as those described in this chapter, need different degrees of socio-ecosystem interaction for nature to become a service. On the other hand, the ways in which ES are distributed and captured have also changed. In ancient times, many ES (both marine and terrestrial) were potentially "open access." However, the institutions that have contributed to ES protection against increasing pressures on the marine space have also generated access barriers, causing great asymmetries and inequalities in the capture of benefits derived from ES (Laterra et al. 2019a; Vergara et al. 2020).

For the marine ES studied in this chapter, we observe a gradient in co-production in terms of the "human effort" delivered so that nature becomes a service and

society can appropriate its benefits. At the beginning of this gradient, we have the ES of sense of place, for which there is an almost straight appropriation of benefits by local inhabitants. This means that the capture of sense of place is not mediated by other factors. Then, food from artisanal fisheries requires a fishing effort for the service to be appropriated. The ES of education and knowledge opportunities requires close interaction between people and nature so that questions are produced that motivate research, knowledge production and learning. Towards the end of the gradient, there are recreation opportunities, which need built capital and managerial actions to position places in the tourism markets and advanced logistics and infrastructure to make the tourism activity possible, particularly given the conditions of the southern seas.

Finally, there is the production of food from aquaculture, which is the ES with the greatest need for human intervention in order to become available. This gradient is aligned with the nature of each ES, ranging from pure public goods (sense of place) to private goods traded in markets (aquaculture products). In the latter case, salmon farming is based on the existence of secure and individual property rights (granted to each firm through an aquaculture concession) that make this provision ES perfectly exclusive and rival. Both the co-production and the public/private good gradient are associated with the level of appropriation of each ES. While sense of place can be freely appropriated, salmon consumption is affordable only by wealthy consumers in foreign markets.

It is also possible to order the ES according to the type and number of barriers they have. For this, it is necessary to differentiate the barriers that direct versus indirect beneficiaries must overcome. Although in this study there are four types of beneficiaries according to type (direct versus indirect) and location (local within the region and extra-regional or international), here we will especially discuss the barriers that local inhabitants have to access benefits. Food from artisanal fisheries, food from aquaculture, and recreation opportunities have few barriers to legal access and higher financial barriers. On the other hand, sense of place and opportunities for education and knowledge are mediated (to some degree) by legal barriers in terms of the existence of areas with different restrictions and the need to have different permits to carry out marine research.

Market mechanisms, which are reflected in the structure of value chains, generate significant access barriers for the direct local beneficiaries of food from artisanal fisheries and aquaculture and recreation opportunities. Since the fish and tourism industry target global markets, they have restricted the emergence of local market niches or other forms of access not based on markets. This access barrier works synergistically with the financial access barrier, while access to authority does not appear to be a significant barrier for any local direct beneficiary.

Certain beneficiaries access various services through identity, e.g., people who have historically been linked to fishing activities can access marine and coastal areas with cultural significance through their boats. Likewise, certain beneficiaries can access the consumption of marine and coastal products informally, without being mediated by a market. This also shows that an individual or groups of individuals can be direct beneficiaries for one ES and indirect beneficiaries for another.

In this context, ES valuations must consider these dynamics when quantifying benefits.

For indirect beneficiaries, the access barriers identified are generally more significant than those identified for direct beneficiaries. Legal access barriers are binding for food from aquaculture and recreation opportunities. Who can overcome these barriers to be able to insert themselves into the value chains that produce these services? Almost exclusively companies and capitals with knowledge of the laws that regulate activities and with access to legal advice. The creative industries go through the same filters. The ES of food from fisheries has multiple legal barriers that exclude indirect beneficiaries. Who can access? In general, artisanal fishers who have been in the activity for a longer time and who fish even before the current fishing legislation was generated. In this case there is a synergy between access through identity and legal access.

Financial barriers are relevant in the case of food from aquaculture and recreation opportunities since the costs of installing an aquaculture concession or a marine and coastal tourism service in Patagonia are high. Who can overcome these barriers to be able to insert themselves into the value chains that produce these services? Almost exclusively foreign or national companies, but as global chains. The provision of food from fisheries encounters financial access barriers related to investment in vessels and the costs of the fishing operation itself. For the creative industries, access barriers are high, but they are at least partially overcome through state financial instruments.

In the case of ES inserted in global distribution chains, access to markets requires consolidated business networks that are supported by governments to position Chilean products abroad (e.g., ProChile). Who has access? Consolidated national or global financial capitals that exclude smaller local capitals. These same indirect beneficiaries are the ones who more easily access authority through public-private alliances, which allows them to better position their interests on the public agenda.

Any recommendation arising from our results requires answering two normative questions: Is it desirable that the benefits of the ES are captured primarily by local inhabitants? Is it securing their access over foreign beneficiaries a value in itself? These questions are relevant, and answering them is not in the hands of researchers, but they should emerge from the social agreements that the different actors must make within a democratic governance system. If the agreed-upon answers are affirmative, then it would be necessary to make institutional adjustments that allow the removal of several barriers. For example, the tourism policy of Magallanes is oriented towards the positioning of Patagonia as a global destination; this is reinforced because of the public-private alliances that articulate the policy, which are made up of the same actors that currently provide tourism services, do not include potential local beneficiaries. Regarding tourism, the focus has been continuously placed on the generation of economic profits rather than on allowing local inhabitants to get to know their region or on generating small-scale enterprises with a local identity. Directing this type of policy towards local markets can also help the region to gain resilience in the face of events such as the coronavirus pandemic experienced during 2020–2021 and that has severely affected the Magallanes region.

A major territorial transformation is the generation of the necessary infrastructure to promote local capture of ES benefits, which includes infrastructure for roads, tourism, ports, and spaces for the exchange of products. In the same way, a profound review is necessary of the way in which extractive use rights are granted and the privileges that these grant. These rights, in the figure of a marine concession (aquaculture, mining), are at the center of territorial disputes in southern Chile (Tecklin 2016). Although these rights embody the privatization of certain marine spaces, they have remained unchanged since their enactment. In summary, for the ES approach to have a true option of influencing marine planning, it must go beyond merely evaluating ES supply. The way in which ES are co-produced tells us much about who may or may not benefit, while their current distribution and the barriers preventing equitable distribution can teach us what must be overcome for fair and sustainable marine governance.

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References

Aldunate Wegner P (2013) Imagen país: Los casos del vino y el salmón chileno (2007–2011) [Master's thesis, Universidad de Chile]. http://repositorio.uchile.cl

Alexander PA, Schallert DL, Reynolds RE (2009) What is learning anyway? A topographical perspective considered. Educ Psychol 44(3):176–192

Anticamara JA, Watson R, Gelchu A, Pauly D (2011) Global fishing effort (1950–2010): trends, gaps, and implications. Fish Res 107(1–3):131–136. https://www.sciencedirect.com

Arkema KK, Verutes GM, Wood SA, Clarke-Samuels C, Rosado S, Canto M, Rosenthal A, Ruckelshaus M, Guannel G, Toft J, Faries J, Silver JM, Griffin R, Guerry D (2015) Embedding ecosystem services in coastal planning leads to better outcomes for people and nature. Proc Natl Acad Sci 112(24):7390–7395. https://www.pnas.org

Artigas C, Escobar J (2001) Perfil de la cooperación para la investigación científica marina en América Latina y el Caribe. CEPAL

Ávila Ruiz RM (2005) Reflexiones sobre la enseñanza y el aprendizaje del patrimonio integrado: una experiencia en la formación de maestros. Revista de Investigación en la Escuela 56:43–53. https://idus.us.es

Bennett EM, Cramer W, Begossi A, Cundill G, Díaz S, Egoh BN, Geijzendorffer IR, Krug CB, Lavorel S, Lazos E, Lebel L, Martín-López B, Meyfroidt P, Mooney HA, Nel JL, Pascual U, Payet K, Pérez-Harguindeguy N, Peterson GD, Prieur-Richard AH, Reyers B, Roebeling P, Seppelt R, Solan M, Tschakert P, Tscharntke T, Turner BL II, Verbug PH, Vigilizzo EF, White PCL, Woodward G (2015) Linking biodiversity, ecosystem services, and human well-being: three challenges for designing research for sustainability. Curr Opin Environ Sustain 14:76–85. https://www.sciencedirect.com

Braat LC, De Groot R (2012) The ecosystem services agenda: bridging the worlds of natural science and economics, conservation and development, and public and private policy. Ecosyst Serv 1(1):4–15. https://www.sciencedirect.com

Brauman KA, Daily GC, Duarte TKE, Mooney HA (2007) The nature and value of ecosystem services: an overview highlighting hydrologic services. Annu Rev Environ Resour 32:67–98. https://www.annualreviews.org

Burkhard B, Kroll F, Nedkov S, Müller F (2012) Mapping ecosystem service supply, demand and budgets. Ecol Indic 21:17–29. https://www.sciencedirect.com

Castillo C (2011) Informe Final Proyecto FIP 2008–45
Chávez Zúñiga E, Milahuichún Mayorga C (2011) Los efectos socioeconómicos de la salmonicultura en la región de Magallanes. [tesis de pregrado, Universidad de Magallanes]. http://www.bibliotecadigital.umag.cl
Clare K (2013) The essential role of place within the creative industries: boundaries, networks and play. Cities 34:52–57. https://www.sciencedirect.com
Collipal Pichicona C (2017) Profesionalización de la actividad turística en Chile. Evolución y avances en el capital humano de la actividad turística chilena. Trilogía Ciencia-Tecnología-Sociedad 29(40):46–59. https://repositorio.utem.cl
CONAF (2013) Catastro y Evaluaci´on de Recursos Vegetacionales Nativos de Chile, Informe Regional. Uso del suelo de la XII Region
CONICYT PR (2009) Diseño de la Política Regional de Ciencia, Tecnología e Innovación de la Región de Magallanes
Cook D, Malinauskaite L, Davíðsdóttir B, Ögmundardóttir H, Roman J (2020) Reflections on the ecosystem services of whales and valuing their contribution to human well-being. Ocean Coast Manag 186(15) https://www.sciencedirect.com
Cruz Rueda E (2008) Mecanismos de consulta a los pueblos indígenas en el marco del convenio 169 de la OIT: el caso mexicano. Revista Pueblos y fronteras digital 3(5):74–111
Daw T, Brown K, Rosendo S, Pomeroy R (2011) Applying the ecosystem services concept to poverty alleviation: the need to disaggregate human Well-being. Environ Conserv 38(4):370–379. https://www.cambridge.org
Drake G (2003) 'This place gives me space': place and creativity in the creative industries. Geoforum 34(4):511–524. https://www.sciencedirect.com
EPAUSTRAL (2019) Memoria 2019. https://www.epaustral.cl
Erickson K (2018) Intellectual property and creative industries policy in the UK. In: Abbe E, Brown L (eds) Research handbook on intellectual property and creative industries. Edward Elgar Publishing, Cheltenham
FAO (2019) Fishery and Aquaculture Statistics. Global Fisheries commodities production and trade 1976–2017 (FishstatJ). In: FAO Fisheries and Aquaculture Department [online]. Rome. Updated 2019. https://www.fao.org/fishery/statistics/software/fishstatj/en
Felipe-Lucia MR, Martín-López B, Lavorel S, Berraquero-Díaz L, Escalera-Reyes J, Comín FA (2015) Ecosystem services flows: why stakeholders' power relationships matter. PLoS One 10(7):e0132232. https://journals.plos.org
Fischer A, Eastwood A (2016) Coproduction of ecosystem services as human–nature interactions—an analytical framework. Land Use Policy 52:41–50. https://www.sciencedirect.com
Gallina M, Williams A (2015) Variations in sense of place across immigrant status and gender in Hamilton, Ontario; Saskatoon, Saskatchewan; and, Charlottetown, Prince Edward Island, Canada. Soc Indic Res 121(1):241–252. https://pubmed.gov
Garcia SM, De Leiva Moreno JI (2005) Evolution of the state of fish stocks in the Northeast Atlantic within a precautionary framework, 1970–2003: a synoptic evaluation. ICES J Mar Sci, 62(8):1603–1608
Gertler MS (2004) Creative cities: what are they for, how do they work, and how do we build them? (pp. 1–21). Ottawa: Canadian Policy Research Network, Family Network
Guinovart JJ (2009) Mind the gap: bringing scientists and society together. Cell 137(5):793–795. https://europepmc.org
Gleisner C, Montt S (2014) Yagán: serie introducción histórica y relatos de los pueblos de Chile
Gustafson P (2001) Roots and routes: exploring the relationship between place attachment and mobility. Environ Behav 33(5):667–686. https://journals.sagepub.com
Harambour AR (2017) Soberanía y corrupción. La construcción del Estado y la propiedad en Patagonia austral (Argentina y Chile, 1840–1920) 1. Historia (Santiago), 50(2):555–596
Harambour A (2019) Soberanías fronterizas: Estados y capital en la colonización de Patagonia (Argentina y Chile, 1830–1922). Ediciones Universidad Austral de Chile

Hargreaves-Allen VA (2020) The economics of marine reserves. In Oxford Research Encyclopedia of Environmental Science. https://oxfordre.com

Hartwell H, Hemingway A, Fyall A, Filimonau V, Wall S (2012) Tourism engaging with the public health agenda: can we promote 'wellville' as a destination of choice? Public Health 126(12):1072–1074. https://pubmed.gov

Hein L, van Koppen CK, van Ierland EC, Leidekker J (2016) Temporal scales, ecosystem dynamics, stakeholders and the valuation of ecosystems services. Ecosyst Serv 21:109–119. https://www.sciencedirect.com

Irarrázaval F, Bustos B (2020) ¿Peces Gordos y Peces pequeños?: Los empresarios salmoneros, cambio institucional y conflicto sectorial en Chile. Polis (Santiago) 19(56):158–184. https://scielo.conicyt.cl

Jobstvogt N, Watson V, Kenter JO (2014) Looking below the surface: the cultural ecosystem service values of UK marine protected areas (MPAs). Ecosyst Serv 10:97–110. https://www.sciencedirect.com

Kaltenborn BP (1998) Effects of sense of place on responses to environmental impacts: a study among residents in Svalbard in the Norwegian high Arctic. Appl Geogr 18(2):169–189. https://www.sciencedirect.com

Lamers M, Haase D, Amelung B (2008) Facing the elements: analysing trends in Antarctic tourism. Tour Rev 63(1):15–27. https://www.emerald.com

Landers D, Nahlik A (2013) Final ecosystem goods and services classification system (FEGS-CS). U.S. Environmental Protection Agency, Washington, DC, EPA/600/R-13/ORD-004914, 2013. https://www.epa.gov

Laterra P, Nahuelhual L, Vallejos M, Berrouet L, Arroyo Pérez E, Enrico L, Jiménez-Sierra C, Mejía K, Meli P, Rincón-Ruíz A, Salas D, Špirić J, Villegas JC, Villegas-Palacios C (2019a) Linking inequalities and ecosystem services in Latin America. Ecosyst Serv 36:100875. https://www.sciencedirect.com

Laterra P, Nahuelhual L, Gluch M, Sirimarco X, Bravo G, Monjeau A (2019b) How are jobs and ecosystem services linked at the local scale? Ecosyst Serv 35:207–218

Liquete C, Piroddi C, Drakou EG, Gurney L, Katsanevakis S, Charef A, Egoh B (2013) Current status and future prospects for the assessment of marine and coastal ecosystem services: a systematic review. PLoS One 8(7):e67737. https://journals.plos.org

Mac-Lean Bravo CA (2010) Plan de Negocios para un Hotel Boutique Ubicado en la Patagonia

Martino S, Tett P, Kenter J (2019) The interplay between economics, legislative power and social influence examined through a social-ecological framework for marine ecosystems services. Sci Total Environ 651:1388–1404. https://www.sciencedirect.com

MEA (2005) Ecosystems and human Well-being: current state and trends, volume 1. Island Press, Washington, DC

Méndez C, Reyes O, NUEVO DELAUNAY, A. M. A. L. I. A., Trejo V, Barberena R, Velásquez H (2011) Ocupaciones humanas en la margen occidental de Patagonia Central: eventos de poblamiento en Alto Río Cisnes. Magallania (Punta Arenas) 39(2):223–242

MINEDUC, Ley N. (2011) 20.529 que crea el Sistema Nacional de Aseguramiento de la Calidad de la Educación Parvularia. Básica y Media y su Fiscalización, año.2011

Mora M (2012) Territorialidad nasa en Bogotá: apropiación, percepción y sentido de lugar. Cuadernos de Geografía: Revista Colombiana de Geografía 21(1):83–98. https://revistas.unal.edu.co

Nahlik AM, Kentula ME, Fennessy MS, Landers DH (2012) Where is the consensus? A proposed foundation for moving ecosystem service concepts into practice. Ecol Econ 77:27–35. https://www.sciencedirect.com

Nahuelhual L, Vergara X, Bozzeda F, Campos G, Subida MD, Outeiro L, Villasante S, Fernández M (2020) Exploring gaps in mapping marine ecosystem services: a benchmark analysis. Ocean Coast Manag 192:105193. https://www.sciencedirect.com

Nasimba C, Cejas M (2015) Diseño de productos turísticos y sus facilidades. Qualitas 10:22–39. https://www.unibe.edu.ec

Poblete EG, Olivares JQ, Experto T, González GM, Araya EL, Álvarez FT, Díaz JM (2013) Política Pública de Desarrollo Productivo para la Pesca Artesanal

Potschin-Young M, Haines-Young R, Görg C, Heink U, Jax K, Schleyer C (2018) Understanding the role of conceptual frameworks: Reading the ecosystem service cascade. Ecosyst Serv 29:428–440. https://www.sciencedirect.com

Rova S, Pranovi F (2017) Analysis and management of multiple ecosystem services within a social-ecological context. Ecol Indic 72:436–443

Rozzi R, Massardo F, Cruz F, Grenier C, Muñoz A, Mueller E (2010) Galapagos and Cape Horn: ecotourism or greenwashing in two iconic Latin American archipelagoes? Environ Philos 7(2):1–32. www.umag.cl

Rozzi R, Heidinger K, Massardo F (2019) Tracing Darwin's path in Cape Horn. University of North Texas Press, Denton

Ruckelshaus M, McKenzie E, Tallis H, Guerry A, Daily G, Kareiva P, Polasky S, Ricketts T, Bhagabati N, Wood SA, Bernhardt J (2015) Notes from the field: lessons learned from using ecosystem service approaches to inform real-world decisions. Ecol Econ 115:11–21. https://www.sciencedirect.com

Ruiz RMÁ (2005) Repensando la Enseñanza del Arte desde una perspectiva multicultural. Implicaciones didácticas. Enseñar ciencias sociales en una sociedad multicultural. Una mirada desde el mediterráneo, 60:33

Schirpke U, Scolozzi R, De Marco C, Tappeiner U (2014) Mapping beneficiaries of ecosystem services flows from Natura 2000 sites. Ecosyst Serv 9:170–179. https://www.sciencedirect.com

Scoones I, Wolmer W (2003) Introduction: livelihoods in crisis: challenges for rural development in Southern Africa. IDS Bull 34(3):1–14. https://onlinelibrary.wiley.com

SERNAPESCA (2001) R. A. Decreto Supremo 320. Ministerio de Economía Fomento y Reconstrucción, Santiago, Chile. 2019

SERNAPESCA (2019) Listado de precios promedio primera transacción. Información obtenida por ley de transparencia. Ministerio de economía, Fomento y reconstrucción, Santiago, Chile. 2019

Sernatur (Servicio Nacional de Turismo) (2018) Plan de Accion Region de Magallanes y la Antartica Chilena. Sector Turismo. 2014–2018. Gobierno de Chile.

SII, Servicio de impuestos (2019) Estadísticas de empresas por región y comuna. Departamento de estadísticas.

Spangenberg JH, von Haaren C, Settele J (2014) The ecosystem service cascade: further developing the metaphor. Integrating societal processes to accommodate social processes and planning, and the case of bioenergy. Ecol Econ 104:22–32. https://www.sciencedirect.com

Spencer KR, Werness-Rude MD (eds) (2015) Maya imagery, architecture, and activity: space and spatial analysis in art history. University of New Mexico Press, Albuquerque

Stokowski PA (2002) Languages of place and discourses of power: constructing new senses of place. J Leis Res 34(4):368–382. https://www.tandfonline.com

SUBPESCA (2020) Estado de Situación de Las Principales Pesquerías Chilenas, Año 2019. Departamento de pesquerías, División de Administración Pesquera. http://www.subpesca.cl

Subsecretaría de Turismo S (2016) Herramientas para emprendedores y empresarios turisticos. http://www.biblioteca.digital.gob.cl

Subsecretaría de Turismo (2019) Informe de cruceros internacionales en los puertos de Chile. Ministerio de Economía, Fomento y Reconstrucción, Santiago, Chile, 2019. 7

Subsecretaria de Turismo S (2020) Lineamientos para la comercialización de experiencias auténticas de turismo indígena en Chile. http://www.biblioteca.digital.gob.cl

Tecklin D (2016) Sensing the limits of fixed marine property rights in changing coastal ecosystems: salmon aquaculture concessions, crises, and governance challenges in southern Chile. J Int Wildl Law Policy 19(4):284–300. https://www.tandfonline.com

TEEB (2010) In: Kumar P (ed) The economics of ecosystems and biodiversity ecological and economic foundations. London and Washington, Earthscan

Tonko J (2008) Relatos de viaje kawésqar. Onomázein: Revista de lingüística, filología y traducción de la Pontificia Universidad Católica de Chile 18(2):11–47. http://onomazein.letras.uc.cl

Townsend M, Davies K, Hanley N, Hewitt JE, Lundquist CJ, Lohrer AM (2018) The challenge of implementing the marine ecosystem service concept. Front Mar Sci 5:359

Valenzuela JR (2015) Gestión local del turismo: el municipio y su rol en el desarrollo turístico en Chile. Gestión Turística (23):34–56. https://revistas.uach.cl

Vera Garnica J (2009) Cluster del Salmón en Chile: análisis de los factores de competitividad a escala internacional. Revista venezolana de gerencia 14(47):343–370. http://ve.scielo.org

Vergara X, Carmona A, Nahuelhual L (2020) Spatial coupling and decoupling between ecosystem services provisioning and benefiting areas: implications for marine spatial planning. Ocean Coast Manag 105455. https://www.sciencedirect.com

Worm B, Barbier EB, Beaumont N, Duffy JE, Folke C, Halpern BS, Jackson J, Heike KL, Micheli F, Palumbi SR, Sala E, Selkoe KA, Stachowicz J, Watson R (2006) Impacts of biodiversity loss on ocean ecosystem services. Science 314(5800):787–790. https://science.sciencemag.org

Zelada Muñoz S, Park Key J (2013) Análisis crítico de la Ley Lafkenche (N 20.249): El complejo contexto ideológico, jurídico, administrativo y social que dificulta su aplicación. Universum (Talca) 28(1):47–72. https://scielo.conicyt.cl