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Participatory indicators of sustainability for the salmon industry: The case of Chile

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ABSTRACT

In this paper a methodological approach is proposed and applied to undertake a participatory process to obtain sustainable development indicators for the salmon sector in Chile including a common vision of sustainability for this industry. The selected indicators are a mix of bottom-up and top-down approaches, which capture the specific needs and perceptions of the different stakeholders related to salmon farming while allowing a high degree of international comparability. A detailed step by step description of the methodology allows understanding how to obtain acceptable social, economic and environmental indicators, a result that can be replicated in other natural resource based productive sectors that are common in developing contexts.

1. Introduction

In the last 15 years salmon farming in Chile has experienced explosive growth, becoming the fourth most important export in the country and establishing Chile as the second most important salmon exporter worldwide [5]. However, this industry faces complex sectoral challenges, as is also the case for many similar resource intensive sectors such as mining or forestry. Its development has been particularly sensitive to the perceptions of different stakeholders in terms of the sustainability at the national, regional and local levels. The underlying issue is that salmon farming represents a use of marine resources distinct from traditional activities, that puts pressure on urban services and infrastructure, brings in new people and culture, and many times competes for labor or with the development of other economic activities such as tourism. The acceptability of this industry is thus constantly questioned.

The complexity of identifying and assessing the net benefits associated with the development of salmon farming and of taking full account of the differing and competing interests, suggests the need for developing indicators [14, 22]. Considering that each stakeholder cares differently for specific dimensions, a set of indicators is required, as opposed to a single index that provides a one dimensional metric [3].[1]

In this context, a methodological approach is proposed and applied to undertake a participatory process to obtain sustainable development indicators for the salmon sector in Chile. A first important step for this is to develop a common vision of the competing groups with respect to the sustainability of salmon farming. Following a rigorous approach, a short list of indicators is then constructed that describes the performance of the industry in dimensions critical for relevant stakeholders, including local communities, academics and the industry. A bottom-up process was complemented by a top-down approach to develop this short list [30]. The practical process followed is described in detail and is a contribution of this paper.

The next section present the conceptual framework and specific methodology followed in this study. Section 3 describes the selection of stakeholders and how perceptions were elicited. Sections 4 and 5 describe the selection of indicators based on different criteria. Section 6 addresses how the indicators support a sustainability vision. Finally, Section 7 presents the main conclusions of the study.

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[1] Stiglitz el al. ([25], p. 12) state that "The issue of aggregation across dimensions (that is to say, how we add up, for example, a measure of health with a measure of consumption of conventional goods), while important, is subordinate to the establishment of a broad statistical system that captures as many of the relevant dimensions as possible."

2. Conceptual framework and methodology applied

2.1. Conceptual framework

The association between sustainability and indicators emerged with force in the 1990s [19]. As Rey-Valette et al. [22] point out; indicators were first designed per sustainable development pillar: economic, social, environmental and institutional. Initially, indicators were applied mostly in the economic area [26,31]. Subsequently, environmental indicators emerged that describe a system in terms of its pressure or state [20,10] and through response indicators [9]. Finally, sustainable development indicators (SDI) were introduced and have been applied in several countries [27].

In terms of process, initially, experts were called in to define the required indicators that should be global in scope, transferable, generic and scientifically valid [7]. However, such indicators generally lacked legitimacy and did not respond to the specific circumstances of an affected locality. More recent literature points to the importance of stakeholder participation in developing indicators, ensuring the quality of the selected indicators and greater effectiveness in monitoring sustainable development [24,21,12]. Indicators should allow a community to understand its current state, identify its goals and determine the progress it has made toward them. A participatory process promotes a sense of ownership of the indicators.

Chamaret et al. [7] indicate that "indicators are only relevant and useful if they fit the user's needs. A participatory (bottom-up) approach answers many of the needs for information and management tools of the actors… and also can enhance the legitimacy of such indicators." They propose that the challenges of legitimacy in the eyes of stakeholders and the major differences between the impacts in different localities, require that indicators from international frameworks (top-down) be complemented by indicators that more directly answer to the issues of a specific localities and its stakeholders. Additionally, Stiglitz el al. ([25], p. 12), indicate that "such a system must, of necessity, be plural (as opposed to a unique index) – because no single measure can summarize something as complex as the well-being of the members of society, our system of measurement must encompass a range of different measures."

Finally, Nevens et al. [18] and Meppem and Gill [16] indicate that to consider the long term impacts, indicators must be part of a common vision of the competing groups with respect to the sustainability of the productive activity. This vision incorporates the principal values of the different interest groups and should motivate and mobilize them, as well as guide the construction of future measurements.

There are few applications of participatory indicators for salmon farming. Vandermeulen [28] proposes indicators using a top-down approach. Boyd and Charles [4] analyze for Canada the impact of fisheries on sustainable development at the community level using a top-down approach. Main stakeholders are identified, a common vision is developed and indicators of sustainability are proposed. Studies for Chile are few and emphasize only some specific aspects. [1], examine the social impacts, specifically on employment, culture and traditional ways of life. Buschmann et al. [5] and Barton and Fløysand [2] study the socio-ecological impacts of salmon farming on stakeholders and its relation to public policies and regulations in Chile. Velasquez et al. [29] present an informatic system to monitor sustainability indicators, however does not present the process required to define the indicators.[2] There is no study for Chile that presents indicators associated to the three dimensions of sustainability nor that considers a bottom-up approach complemented by a top down approach.

2.2. Methodology applied

As discussed, the construction of lists of indicators is usually based on two approaches. The first bottom-up approach captures the specific perceptions of the stakeholders. Relevant stakeholders must be actively involved. The second top-down approach draws on expert opinions and the international literature. In this paper an eclectic approach is applied that combines both, to take advantage of their respective strengths [30].

In parallel, a vision that includes the long-term principles that should guide salmon farming development was built participatively with the relevant stakeholders. The indicators are then associated to each principle and used as a measure of the achievement of the desired vision of sustainability for the salmon sector. Whereas the principles and vision should be maintained over time, the indicators will most probably evolve and change.

The specific methodology to construct the list of sustainability indicators of the salmon industry was developed in five steps, shown in the diagram below. Each step is discussed in the following chapters presenting the main issues and methodological concerns required to obtain concrete indicators acceptable for all those involved in the process Diagram 1.

3. Identification of stakeholders and survey of their perceptions[3]

The first step of the methodology consisted of identifying the groups related to salmon farming and planning the survey of their perceptions through workshops and interviews. The geographic areas of direct and indirect influence of the salmon industry were defined, and the stakeholders identified. Their main perceptions and needs were surveyed in a participatory process in a series of workshops. The approach was bottom-up to capture stakeholder concerns that would then be covered by the indicators. Through this approach the vision of sustainability (described in Section 6) was identified.

3.1. Defining the areas of influence of the salmon industry

The area of influence of the salmon industry was defined as communities where a significant percentage of the economically active population (EAP) is involved in fisheries[4] based on secondary information, such as census data and maps showing populated areas in the 10th and 11th Regions of Chile. The communities were then ranked according to the importance of commercial fisheries. Data such as the companies related to the salmon industry and the location of associated facilities were incorporated to more precisely define the areas of influence of the industry.

Finally, the communities where salmon farming is important were identified. This analysis was focused on communities such as Puerto Montt and Calbuco where main offices of salmon producers and service and product providers of the industry are located. Also, communities were identified where there is a high concentration of salmon-farming activities, as well as communities with a high concentration of companies and significant projected growth in

[2] The study by Velasquez is complementary to the one presented in this paper. Both are part of the same original study.

[3] See "El Proceso Participativo para el Levantamiento de Percepciones de la Salmonicultura" by Regina Massai and Miguel Bahamondes, in final report of the Project INNOVA Chile, "Sistema de Indicadores de Desarrollo Sustentable de la Industria del Salmón en Chile: Asegurando la Competitividad en el Largo Plazo".

[4] This includes small-scale fishing and salmon farming associated mainly with commercial activities.