Int J Life Cycle Assess (2014) 19:1506–1514
DOI 10.1007/s11367-014-0758-6

SOCIETAL LCA

Integrating participatory approaches into social life cycle assessment: the SLCA participatory approach

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Received: 11 February 2014 / Accepted: 15 May 2014 / Published online: 28 May 2014

Abstract
Purpose This article discusses the choice of stakeholder categories and the integration of stakeholders into participatory processes to define impact categories and select indicators.
Methods We undertook a literature review concerning the roles and the importance of stakeholders in participatory processes, and the use of such processes in environmental and social LCAs (Biswas et al. Int J Life Cycle Assess 3(4):184-190, 1998; Sonnemann et al. Int J Life Cycle Assess 6(6):325-333, 2001; Baldo Int J Life Cycle Assess 7(5):269-275, 2002; James et al. Int J Life Cycle Assess 7(3):151-157, 2002; Bras-Kapwijk Int J Life Cycle Assess 8(5):266-272, 2003; Mettier et al. Int J Life Cycle Assess 11(6):468-476, 2006). As part of the French National Research Agency *Piscenlit* project, we adapted the Principle, Criteria, Indicator (PCI) method (Rey-Valette et al. 2008), which is an assessment method of sustainable development, as a way to integrate the participatory approach into Social Life Cycle Assessment (SLCA) methodology, mainly at the impact definition stage.
Results and discussion Different views of participation were found in the literature; there is no consensual normative approach for the implication of stakeholders in LCA development. Some attempts have been made to integrate stakeholders into environmental LCAs but these attempts have not been generalized. However, they strongly emphasize the interrelationship between research on the growing integration of stakeholders and on the choice of stakeholders. We then propose criteria from stakeholder theory (Freeman 1984; Mitchell et al. Acad Manage Rev 22(4):853-886, 1997; Geibler et al. Bus Strat Environ 15:334-346, 2006) in order to identify relevant stakeholders for SLCA participatory approach. The adaptation of the PCI method to Principles, Impacts, and Indicators (PII) enables stakeholders to express themselves and hence leads to definitions of relevant social indicators that they can appropriate. The paper presents results regarding the selection of stakeholders but no specific results regarding the choice of impact categories and indicators.
Conclusions and recommendations Integrating a participatory approach into SLCAs is of interest at several levels. It enables various factors to be taken into account: plurality of stakeholder interests, local knowledge, and impact categories that make sense for stakeholders in different contexts. It also promotes dialogue and simplifies the search for indicators. However, it requires a multidisciplinary approach and the integration of new knowledge and skills for the SLCA practitioners.

Keywords Impact choices · Participatory approach · SLCA · Stakeholder

1 Introduction

An increasing number of scientific articles contribute to the development of the conceptual framework for Social Life Cycle Assessment (SLCA). They mostly deal either with issues concerning the definition of functional units, baselines to evaluate changes due to impact (Macombe et al. 2011), and boundaries and their convergence with those of environmental life cycle assessments (Reap et al. 2008), with the availability of indicators (Benoit-Norris 2014), and with interests for decision-making processes, or with issues concerning the foundations of impact choice (Reitinger et al. 2011) in order

Responsible editor: Andreas Moltesen

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to position SLCAs from an epistemological viewpoint. The first kinds of issues are documented but it remains far from being resolved. There is much room for progress in the theoretical foundations of social impact choice. Two fields of theoretical research concerning the nature and the integration of stakeholders in SLCA emerge from the literature review. There is a need to take into consideration the evolution of the paradigm of the firm which has extended the boundaries of the latter and consequently the range of actors to be taken into account. And there is also a need to consider the evolution of the evaluation paradigm which is tending to develop participatory approaches with indicators chosen and evaluated not only by experts but also by the individuals concerned (beneficiaries, users, and those affected). In publications relating to SLCAs, stakeholders appear as the targets of impacts and occasionally as participants in impact definition, as for instance in the LC Impact project.[1] This characterization is fine if the main aim is the objective measurement of impacts, as is the case with environmental LCAs (E-LCA). However, if we take into account progress in social impact measurement (Sen 1999), it becomes essential to integrate the opinions not only of those affected by the impacts but also of those such as public decision-makers who affect the evolution of these impacts through regulatory measures. This approach gives a broader vision of the way stakeholders are defined and how their role is understood. We focus here exclusively on a vision of stakeholders as participants in impact definition, which we call "the SLCA participatory approach."

Within the framework of the French project *Piscenlit* (PISCiculture Écologiquement InTensive—Ecologically intensive fish farming) funded by the French National Research Agency, stakeholder participation consisted of organizing surveys and focus groups at different stages of the SLCA development process. Such participation enables social representations to be expressed in ways that make sense for stakeholders, who are identified on the basis of criteria from the stakeholder theory (Freeman 1984; Mitchell et al. 1997; Geibler et al. 2006). Then the approach reveals the impacts on which it is important to focus. However, it is the SLCA practitioners who have the final say concerning the indicators to measure the impacts.

In this paper, we discuss the crucial methodological choices in the development of SLCA participatory approaches, beginning with how the literature has dealt with the question of stakeholder choice ("The interest of participation and the issue of stakeholder choice"). Then in "Stakeholders and participation in LCA approaches," we consider who are the stakeholders and the ways in which they are included in the literature on environmental and social LCAs. "The steps in the SLCA participatory approach" describes the SLCA participatory approach. "An application of the identification of the stakeholders" presents an application of stakeholder selection in the case of fish farming systems. We conclude by discussing why it is of interest to introduce participatory approaches and the problems with, and the limits to, the approach, as well as outlining further research needs.

2 The interest of participation and the issue of stakeholder choice

2.1 What are the main interests of participation approaches?

Participation is one of the nonmarket mechanisms that facilitate stakeholder coordination. The objective of participatory approaches is to develop democratic practices by promoting expression and communication by interest groups, by taking into account all interests and by building consensus in order to facilitate the implementation of sustainable development (Dalal-Clayton and Bass 2002). The issue of sustainable development has contributed to the increase in participatory approaches at several levels (European, national, and local). Increased actor participation in the decision-making process is proposed as a means to align stakeholders' viewpoints and interests (Dalal-Clayton and Bass 2002; Rey-Valette et al. 2008). Within the framework of the new vision of evaluation arising from sustainable development issues, stakeholder participation has become an appropriate programming and managing tool (Mendoza and Prabhu 2000; Freebairn and King 2003; Fraser et al. 2006; Rosenström and Kyllönen 2007; Rey-Valette et al. 2008). Participation in the evaluation process, from what is to be evaluated through to the indicators to be used, promotes the appropriation of the indicators by stakeholders and facilitates their use as a baseline (Rey-Valette et al. 2008). If the aim of the evaluation is not merely to inform but also to assist the decision-making process to promote sustainability, stakeholders' opinions must be integrated through participatory approaches. Sustainable development, and even more so social, indicators are context-dependent (Freebairn and King 2003). Participation helps to adapt indicators to the context far more than when they are developed by experts (Mendoza and Prabhu 2000). Stakeholder participation in evaluation development is of interest for many reasons. It guarantees a final set of indicators of better quality (Rosenström and Kyllönen 2007) and which reflect stakeholders' values (Mendoza and Prabhu 2000). It improves democratic representation and promotes empowerment and learning opportunities for communities (Fraser et al. 2006) while encouraging partnerships (Mendoza and Prabhu 2000). However, the quality of the participatory arrangements, in terms of credibility of the procedures (representativeness, transparency of the process, independence of the participants) and the quality of the organization (access to resources, definition of roles, structure and clarity of the decision-making

[1] http://www.lc-impact.eu/about-lc-impact

process, cost effectiveness), determines the quality of the results (Rowe and Frewer 2000). The choice of stakeholders is therefore crucial, especially in order to avoid technocratic participation (Rosenström and Kyllönen 2007).

2.2 How are stakeholders selected in a participatory process?

It is necessary to determine who should be involved in the participatory processes. Although stakeholder identification has become a common theme following Freeman's work (1984), it remains difficult in practice. Stakeholder theory (Freeman 1984) was first applied to the firm then more widely to issues of public decision-making within the framework of public and private development projects (e.g. roads, buildings, and dams). The conception of "stakeholders" can vary greatly, and there is a diversity of identification criteria. There are three stakeholder approaches (Winjberg 2000). Firstly, the descriptive approach depicts the constellation around the firm and identifies whether or not stakeholders' interests are taken into account by firms. Secondly, the instrumental approach focuses on ways to minimize risks for the firm and takes account of such interests by evaluating the impact of stakeholder integration on the performance of the firm. Finally, the normative approach deals with the foundations for stakeholder selection and underlies the search for criteria. In our article, we focus on the latter approach, within which stakeholder selection criteria depend on the definition used by the authors.

Freeman's stakeholder definition (1984) emphasizes the impact criteria. The stakeholder is considered to be an individual who can affect, or be affected by, the firm's activities (Freeman 1984). This vision differs from the elitist vision of Paterman (1970, cited by Beach 2008) which emphasizes the criteria of individuals' competencies. Other criteria were developed later to broaden the range of stakeholders. Asher et al. (2005) emphasized the nature of relationships (compatible or incompatible) and connections (necessary or contingent). The three criteria of Mitchell et al. (1997)—power, legitimacy, and urgency—gave genuine content to stakeholder theory. These criteria allow seven stakeholder categories to be identified from the intersections between the three criteria (Beach 2008). Hence, according to Mitchell et al. (1997), definitive stakeholders can be found at the intersection of the three criteria while those who do not belong to any criteria are nonstakeholders. It should, however, be stressed that for these authors, the choice of stakeholders is context-dependent. Hence, for each problem, the groups of stakeholders are defined from given categories.

Asher et al. (2005) suggested restricting stakeholders to those who have property rights, although forms of contract broader than just shares should be included. They introduce incomplete contracts and implicit contracting thus acknowledging the social forms of contracts and hence of property rights. In the same vein but with a different approach, Geibler et al. (2006) set forth the principle of completeness, which underlies the inclusion of both internal stakeholders (suppliers, clients, firms, trade unions, industry associations) and external ones (NGOs, financial institutions, education, research). This vision is close to the pluralist approach of Renn et al. (1993) which emphasizes the need to incorporate the diversity of all viewpoints in order to integrate them into the decision-making process.

Finally, Sen (1999) suggested an approach based on social justice theory which legitimizes the participation of any individual affected by the decision made, in line with participatory democracy. This approach leads to a less rigid stakeholder typology at the local level but is difficult to operationalize.

This review of the literature shows the diversity of ways to identify stakeholders within participatory approaches. We will see below how this diversity may be combined to constitute a cluster of stakeholders relevant to SLCA concerns.

3 Stakeholders and participation in LCA approaches

3.1 What is the current state of stakeholder participation in LCA approaches?

Stakeholder participation is mentioned neither in ISO Standard 14041 (Bras-Kapwijk 2003) nor in ISO Standard 14044 which refers to "the public" only at the time of information dissemination. Nonetheless, we undertook a review of the LCA literature to identify studies where participation was used. This literature (Biswas et al. 1998; Sonnemann et al. 2001; Baldo et al. 2002; James et al. 2002; Bras-Kapwijk 2003; Mettier et al. 2006) reveals that researchers have differing visions of how to include stakeholders into LCA approaches. There is no consensus on the topic. The role of stakeholders in LCA implementation varies by project (Table 1). Stakeholders may be considered in four ways: (1) as LCA method users, (2) as LCA result users, (3) as victims or beneficiaries of impacts, or (4) as actors in the definition of either the types of relevant impact or more generally LCA methodology. These categories are not mutually exclusive, particularly the fourth one in the case of participatory approaches. Table 1 presents examples within the four categories.

The issue of stakeholders as E-LCA method and result users arose primarily at the end of the 1990s (Biswas et al. 1998). The "ECONOMETRICS' 98" workshop held in Lausanne on the 19th and 20th of January 1998 was an opportunity to discuss the needs of different E-LCA users. A forum involving LCA method users (practitioners) and LCA result users (consumers, designers, private sector decision-makers, as well as politicians and policy makers) was organized in order to validate useful indicators, particularly eco-indicators. Subsequently, the stakeholder issue was addressed

Table 1 Participatory approaches implemented in exemplary environmental LCA studies and in SLCA studies

	Biswas et al. 1998	Sonnemann et al. 2001	Baldo et al. 2002	James et al. 2002	Mettier et al. 2006
Context	Workshop	Workshop	European ecolabel	Research project	Research project
Objectives	Validation of indicators	Transfer of knowledge on life cycle management (LCM)	Instigate a wide-reaching and transparent discussion	Discuss alternatives for dealing with waste	Measure preferences concerning relevant environmental damages
Participatory process	Consultation	Consultation	Dialogue	Information dialogue	Choice experiment
Tools	Forum	Forum	Ad Hoc Working Group	Stakeholder Advisory Committee	Panel survey
Level	N/A	United Nations	Europe	Local state federal	Local
Involvement stage	Final validation	N/A	The whole project except for final vote	The whole project	N/A
Roles attributed to stakeholders	1–2–4	2	3–4	3–4	3–4
Participation significance	Increased cooperation	Experience sharing	Developing a team of experienced experts	Educational role, debate, stakeholder-research interaction	Taking into account human health with respect to ecosystems
Stakeholder selection criteria	Users of eco-indicators	LCM users	Stakeholder affected by the project	Representatives	Students

N/A not available

differently according to the objectives and needs of the research. Sonnemann et al. (2001) stress the usefulness of establishing a forum to share life cycle management experiences. This forum, which was combined with a workshop, highlighted the need to include the socioeconomic dimensions of sustainability into LCAs as well as the institutional and social impacts of the goods produced. The role of stakeholders in these cases was limited to dialogue through the different fora.

The implementation of the European Ecolabel based on E-LCA (Baldo et al. 2002) broadened the role of stakeholders with the organization of an Ad Hoc Working Group. This led to dialogue over an 18-month period on the definition of criteria for the development of the European label. These criteria correspond to the impact categories of this paper. In the end, the criteria adopted by the Member States took account of the criteria validated by stakeholders. Such an approach is common practice in European Union consultative processes especially in the case of public policy. Stakeholder participation increases the credibility of LCA results. Moreover, cognitive aspects can then be developed such as collective awareness, consensus, and cooperation (James et al. 2002).

Participatory approaches are little developed in LCAs but when they are, it appears that stakeholders want to be involved in the entire LCA development process. Moreover, their level of involvement has increased over time, going from consultation to dialogue covering the complete process (Table 1). The approach in Mettier et al. (2006) is one example. They suggested identifying stakeholder preferences by using the choice experiment method (Adamowicz et al. 1998). This method enables environmental goods to be evaluated by determining which attributes of a good have a significant impact on user choice. In this case, it was not used for economic evaluation purposes but to measure stakeholder preferences concerning relevant environmental damages. In other words, this method can be used to identify the grouping or weighting of impact categories (Mettier et al. 2006).

Within the SLCA framework, participation increases the legitimacy of results (Geibler et al. 2006). Diverse lists of impact category can be found in SLCAs (Weidema 2006; Benoit-Norris et al. 2011). According to the classification of Dreyer et al. 2006, these lists include compulsory impact categories from the Universal Declaration of Human Rights and optional categories depending on the context of the firm. Benoit-Norris et al. (2011), following the multistakeholder seminar of 10th and 11th of November 2005, suggest the following elements: human rights, working conditions, health and safety, cultural heritage, governance, and socioeconomic repercussions. However, these lists of normative categories do not allow for the identification of

impact categories that make sense for stakeholders at a local level. Swarr (2011) suggests a framework for a stakeholder dialogue concerning their priorities in terms of sustainability based on Sen's capability approach (Sen 1999).

One possible use for these lists is to promote their adaptation through participatory approaches that consist of ranking impact categories collectively. This practice makes it possible to unite top-down (normative categories) and bottom-up (choice of categories) (Kruse et al. 2009) approaches. As environmental LCAs, SLCAs are tools to aid decision-making; however, they require a methodology able to capture contextual issues. Participation helps to establish the relevant impact categories. One possibility is to use focus groups, a flexible participatory approach in small, more or less homogenous groups that promotes dialogue (Rey-Valette et al. 2008).

The social impact research literature includes both the normative and the contextual aspects. In fact, it highlights the contingent nature of social impacts and therefore the interest of a democratic choice of the latter (Sen 1999). This procedure allows impact categories to be included which make sense for the stakeholders particularly in the social dimension case. It is essential to integrate these conclusions into the SLCA framework.

3.2 What are the criteria for stakeholder selection and what kind of stakeholders are found in the environmental and social LCA literature?

Unlike cases dealt with by environmental LCAs, the stakeholders affected in SLCAs are essentially the primary stakeholders (consumers, workers, industry) and two secondary stakeholders: the local community and, more broadly, society (Benoit-Norris et al. 2011). Table 2 below shows the categories of stakeholders included in different LCA types.

The literature review raises two questions for the use of a participatory approach in SLCAs. How to integrate the approach into the SLCA method? Which criteria should be used to select participants?

In SLCA methodology, participation remains largely anecdotal despite its importance in addressing issues such as users' interest (Jorgensen et al. 2009), and impact selection and weighting (Reap et al. 2008). These areas are all the more important in SLCAs in that these impacts are strongly related to geographical and cultural contexts (Zamagni et al. 2011). However, in SLCAs, the issue of stakeholder participation is rarely addressed. The choice of the impacts is generally determined in a normative fashion using standards established in international conventions (Labuschagne and Brent 2006; Jorgensen et al. 2009; Benoit et al. 2010; Dreyer et al. 2010) or national laws (Dreyer et al. 2006).

4 The steps in the SLCA participatory approach

The use of the SLCA participatory approach enables the selection of impact categories that make sense to stakeholders. The methodological protocol of the participatory approach suggested here (Principles, Impacts, Indicators) is based on the Principle, Criteria, Indicator (PCI) method (Rey-Valette et al. 2008). This approach uses a hierarchical and embedded framework which makes it possible to relate the indicators to contextualized impacts and the general principles of sustainable development. The principle corresponds to a postulate which covers a fundamental or general objective. It is formulated as a rule and is a basis for action. The impact links the principles to the indicator. It is the operational level which identifies how the activity affects human well-being[2] (MEA 2005). The indicator is a way to express the information related to the identified impact. This type of embedded framework helps to put the definition process of the impacts into context, thus allowing it to be related to local and/or sectoral issues. This approach may be used for all dimensions of sustainable development (economic, social, environmental, and governance), but in our case, we adapt it using only the social dimension. Figure 1 shows how a five-step participatory approach was used to select social principles, impacts, and indicators in order to contribute to SLCA development.

The first step consists of selecting stakeholders. In our study, we suggest a normative approach to the criteria which enable the selection of stakeholders within the SLCA framework. The criteria are a combination of those found in the literature on the normative stakeholder approach. Three criteria correspond to the quality of the participation of Rowe and Frewer (2000) relating to stakeholders criteria: impact, legitimacy, and completeness. The properties of these criteria are that they include both those already used in LCA approaches and those which complement the latter in order to have a broad range of viewpoints. The first criterion is close to current LCA approaches insofar as those affected by the production process are taken into account. However, the viewpoint is wider because people who have the power to impact the firm are also taken into consideration (Freeman 1984). The second criterion raises the issue of legitimacy (Mitchell et al. 1997; Sen 1999), i.e., the search for representatives of interest groups. The third criterion integrates the diversity of social representations in order to incorporate different interests and their values (Renn et al. 1993; Geibler et al. 2006). We used these criteria in the case of pond aquaculture to implement a participatory approach to SLCA development.

[2] "Human well-being has several key components: the basic material needs for a good life, freedom and choice, health, good social relations, and personal security" (MEA 2005).

Table 2 Stakeholders included in exemplary environmental LCA studies and in SLCA studies

Stakeholders	Biswas et al. 1998	Baldo et al. 2002	James et al. 2002	Norris 2006	Dreyer et al. 2010; Hunkeler 2006	Benoit et al. 2010	Reitinger et al. 2011
Workers					X	X	X
Consumers	X	X				X	X
Local community						X	X
Society				X		X	
Upstream value chain actors		X	X			X	
Industry associations			X				
Governmental organizations	X		X				
Project sponsors			X				
Non-governmental associations		X	X				
Designers	X						
Private sector decision-makers	X						

The second step consists of collecting data (study of social representations) and reviewing the literature on social aspects (for instance, well-being issues and normative frameworks). Also, data collection is based on interviews with stakeholders about their representations of the social aspects of the activity concerned. The data are analyzed in order to reveal the social principles and impacts which are the most significant for stakeholders. The method is original as it integrates a bottom-up approach through the interviews with a top-down approach that complements the interview results with the significant principles emerging from international conventions and the literature on well-being.

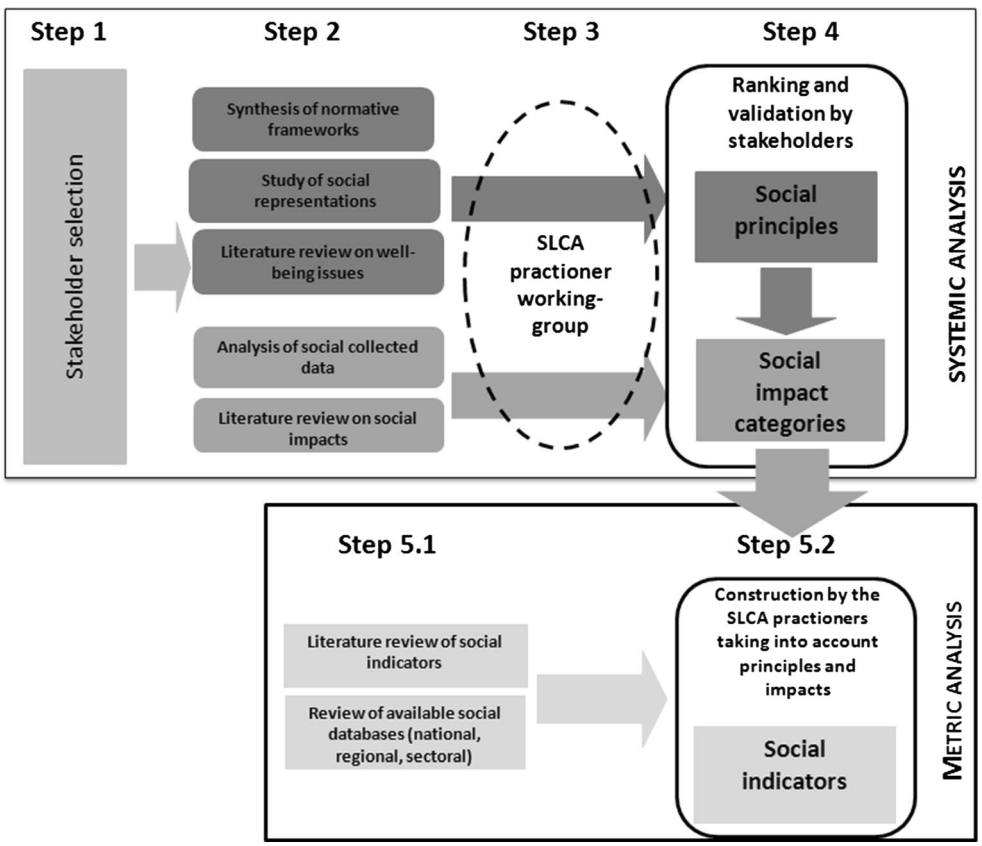

Fig. 1 Steps of SLCA participatory approach

Table 3 Results of the application of the criteria of impact, legitimacy, and completeness, for the fish farming example

Categories	Categories details	Example
Value chain stakeholders	Upstream chain	Hatcheries, seed suppliers, feed suppliers, equipment/material suppliers
	Nonfarmers owners	
	Producers	
	Downstream chain	Retailers, wholesale, processers, fish angler society, consumers
Institutional stakeholders	States, public services and territorial communities	Ministry and local administrations, territorial communities, farmer association, water agency, tourism office, veterinary services
	Research institutes and aquaculture universities	
	Trade organizations and unions	
	Other associations	Neighbor associations
		Consumer associations, NGOs and other associations
Users	Resident (temporary or permanent) users	Tourists, teachers
	Local resident potential users	Lakeside dwellers
	Nonresident users and potential users	Travelers

In the third step, the two approaches are consolidated by a working group consisting of SLCA practitioners from different disciplines (socioeconomics, agronomy, ecology) which enabled an "exhaustive" list of social principles and impacts to be developed. This literature review and the consolidation are also undertaken at indicator level.

During the fourth step the list of social principles and impacts is discussed within stakeholder focus groups so that it could be adapted to the studied context.

The fifth step comprises two parts: first, a literature review of social indicators and databases, which enables a list of existing and available data to be developed and second, the choice of indicators by the researchers according to selected impacts.

The objective of the first four steps is to provide a systemic analysis, more precisely a comprehensive approach to the relationships between principles and impacts. The fifth step is a metric approach to these relationships, with the indicators measuring how the impacts relate to the principles.

5 An application of the identification of the stakeholders

In the ANR-Piscenlit project[3] (2010–2013), the objective is to develop scenarios of ecological intensification[4] for fish farming activity based on the services that it provides as an ecological lever. This study concerns three countries: France (Lorraine, Brenne, and Normandy), Indonesia: Sumatra (Tangkit and Kumpeh) and Brazil: Santa Catarina (Chapeco and the Itajaï Valley). The use of the SLCA approach in the project enables the value of the ecosystem-provided services to be demonstrated through the level of well-being (liberty, security, health, social relations, fundamental material needs) that they generate (MEA 2005). Pond aquaculture is an activity that produces freshwater fish. In Europe, ponds were built in the Middle Ages. They enabled insalubrious areas to be cleaned up, constituted a water reserve for agriculture, and assured fish production. This activity is different from those generally addressed within the LCA framework, which are often industrial with more controlled and standardized processes. In aquaculture, activities are undertaken in small-sized (family-run) or medium-sized enterprises. Sustainable development means that the enterprise is addressed and analyzed differently (Gafsi 2006). In fact, the boundaries are less clear cut and the stakeholder typology must expand in order to include the broadening of the services provided by production systems following the MEA (2005). Hence, enterprises provide other services in addition to fish production. Such services may be cultural (e.g., recreational), regulatory (e.g., climate regulation, flood regulation), or supportive (e.g., support for biodiversity). However, the impact categories included in SLCAs depend on the services that are studied. In our case, we present the selection of stakeholders for all services, thus step 1 of the SLCA participatory approach.

The issue of stakeholder selection arose in our study and we developed a stakeholder matrix (Table 3) on the basis of the criteria described in the previous section.

We identified three broad stakeholder categories: value chain stakeholders, institutional stakeholders, and users. These categories are affected differently (impact criteria) by fish farming production whether in term of exchange (e.g., value chain stakeholders), taxation (e.g., public services), or level of well-being (e.g., users). The categories were

[3] http://www4.inra.fr/piscenlit_eng/

[4] Ecological intensification or ecological intensity can be defined in contrast with "forcing." Forcing may be defined as increasing yield through the use of significant artificial inputs that are external to the "local system." Ecological intensification means obtaining a higher yield per biospheric unit for a given set of viability objectives (Griffon 2010).

subdivided in order to include the diversity of social representations (completeness criteria). The resident and nonresident users and potential users have various visions due to the various duration of their proximity with the services. Finally, we selected representative individuals in each category division (legitimacy criteria). For example, for fishing federations in Lorraine, we interviewed the managers of the departmental federations. This matrix led to a broader vision of the stakeholders in SLCA for fish farming with a view towards a participatory approach.

6 Conclusions

The consequences of participation on managerial or political decisions may vary. Participation may range from simple information or consultation to co-decision-making or even co-management. Such practices are growing at public policy level but at firm level they often remain limited to property right holders (shareholders and other investors) and more tentatively to salaried employees. However, the literature shows that the boundaries of the firm are tending to expand. This vision is in harmony with developments in corporate social responsibility which assume that firms are involved in their environment. Stakeholder theory (Freeman 1984) emphasizes the evolution of the boundaries of the firm, which no longer represents a simple set of relational contracts (Williamson 1990) but an organization that has contractual and noncontractual relationships with its environment (Fréry 1997 cited by Baudry 2003). Taking account of these aspects in SLCAs broadens their scope by integrating progress in these different areas. A participatory approach in SLCAs is of interest at several levels. It enables various factors to be taken into account: plurality of stakeholder interests, local knowledge, and impact categories that make sense for stakeholders in different contexts. Furthermore, it promotes dialogue and simplifies the search for indicators. However, it requires a multidisciplinary approach and the integration of new knowledge and skills for SLCA practitioners. It also raises technical and methodological issues. First, the organization of participation faces the difficulty of maintaining stakeholder commitment throughout the process in terms of resources (financial, human, and so on) and time available for the organization or in terms of participants' availability. Second, this use of participation into the method seeks to adapt the study of social impacts according to the study area. This raises the issue of the comparability of results between areas. One solution to this problem is provided by the adaptation of the PII through the SLCA participatory approach. The principles must be sufficiently generic to allow comparisons to be made. Future research on SLCA methodology must take into account the widening range of actors and the contingent nature of social impact evaluation. This method could be implemented for environmental LCA in order to strengthen the appropriation of indicators.

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