Deconstructing the discourse on social learning:

conceptual and methodological aspects
in natural resource management literature

Edited by Romina Rodela

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Romina Rodela
Marie Curie Fellow

Foreword

Scientists and 'ordinary' citizens alike have different thresholds with respect to the amount of un-clarity, conflict and confusion that they can handle. Some see merit in all three factors and embrace them as drivers of deeper thinking and reflection, while others need clarity, confirmation and assurance. In the world of academia but also in the everyday world of politics, terms, concepts and phrases emerge, be it in journals and newspapers, on *Facebook* or via twitter, that quickly become popular or, to use a more modern word, 'viral'. Words like 'hybrid', 'sustainability', 'green economy', 'community of practice' and 'carbon neutral' are just a few that I have been noticing a lot lately, but there are many others. Depending on one's comfort level with regard to un-clarity, conflict and confusion, such inevitably ill-defined and (therefore?) popular concepts have either an appealing or appalling vagueness. In this report, Romina Rodela is trying to determine the meaning of an emerging form of learning in the context of natural resource management: social learning (a phrase with 9.6 million Google hits as I type this on April 27, 2012). Her work as a Marie Curie Post Doctoral Fellow as a part of the UNESCO Chair in Social Learning and Sustainable Development within the Education & Competence Studies Group of Wageningen University sheds light on the meanings and usages of social learning at various levels (micro, meso and macro) and from different disciplinary and interdisciplinary vantage points.

This report represents a much-needed meta-analysis in this emerging field and pulls together key research articles on social learning in natural resource management and related fields, such as environmental management. Readers looking for the definitive definition of social learning will be disappointed as the word 'definitive' does not seem to exists in multi-stakeholder communities of reflexive learners; rather, these communities seem to be engaged in processes that are 'iterative' and 'emergent'. The contexts in which social learning and natural resource management are used tend to be 'in-flux' or 'dynamic', and the learning taking place is rather blended, taking on many forms from experiential to transmissive, from personal to collaborative, from formal to informal, and so on. Still, there are some common threads that seem to characterise what we might call social learning. The importance of creating social cohesion among the various actors as a prerequisite for using the differences that exist among them is one common point, but there are others that the reader will find within the text. I compliment Dr. Rodela for creating some clarity and shedding some much-needed light on the rising phenomenon of social learning and doing so without trying to freeze or fix the concept in ways that would hamper its potential to contribute to more sustainable natural resource management and, ultimately, to the well-being of the planet as a whole.

Arjen E. J. Wals
Professor and UNESCO Chair of Social Learning and Sustainable Development

Introduction to this publication

There is growing interest within environmental and natural resource management for learning-based approaches that emphasise experimentation and reflective practice. In this context, an emerging conceptual construct about which much has been written is social learning. Social learning has been used in relation to a number of resource issues and is currently attracting the interest of researchers and practitioners. Social learning was also at the core of a research project titled *Social learning in natural resource management: the role of learning, negotiation and social capital for more sustainable natural resource management*, which has received funds from the seventh framework programme of the European Union (Marie Curie-Action IEF). The project had two main objectives. One was to undertake an extensive review of the social learning literature to identify emerging trends and themes. A second objective was to undertake an empirical study and investigate learning processes in a real-world situation. In the following sections, we will report on the activities undertaken to pursue the first objective and will point to emerging trends and themes within the current social learning literature. Namely, will summarise the research outcomes obtained with an extensive review of scientific literature.

Therefore, section one of this publication provides methodological detail and an explanation of how paper selection was undertaken as well as a description of the selected body of works reviewed, i.e., 96 papers published in scientific journals after peer-review. The description given is general and includes the type of research, type of natural resource and distribution across geographical areas, etc.

Then, section two of this publication summarises the results of a more specific analysis designed to unveil how social learning is made operational and how the literature approaches it conceptually.

In section three interdisciplinary engagement and borrowing practices reported in the selected social learning literature are analysed the implications that emerged from these discussed.

In section four, the results of a further analysis, which, in contrast to the previous three, focused on a sub-group of 54 publications and was undertaken in co-authorship with dr. Georgina Cundill and Prof. dr. Arjen Wals, are discussed. The aim of this last analysis was to unveil methodological choices discussed in the selected literature and reflect upon the epistemological base that underpins the social learning discourse.

Most of the research outcomes reported in the following sections were already discussed in journal articles published, or currently in press. This material/text is used with respect to authorship agreements we have signed and with due acknowledgment of the article(s) from which the material/text is taken. Thus, in this publication, we have reproduced portions or excerpts of material or adjusted text from the following three papers:

Rodela, R. 2011. Social learning and natural resource management: the emergence of three research perspectives. *Ecology and Society* 16(4): 30 (doi.org/10.5751/ES-04554-160430).

Rodela, R., Cundill, G., Wals, A.E.J., 2012. An analysis of the methodological underpinnings of social learning research in natural resource Management. *Ecological Economics* 77: 16-26 (doi:10.1016/j.ecolecon.2012.02.032).

Rodela, R. 2012.The social learning discourse: trends, themes and interdisciplinary influences in current research. *Environmental Science and Policy* (doi:10.1016/j.envsci.2012.09.002).

Part I: Conceptual aspects and disciplinary influences

Section one:
Some general trends

1. Introduction

In recent years, the interest in social learning as a conceptual construct useful for research and practice has increased substantially, and as a result, there is a rapidly growing body of literature reporting on a range of empirical cases. However, despite the many contributions, researchers have not reached an agreement on the definition of social learning, operational measures to be used or the role of contextual aspects. As a result, there is a multitude of conceptual frameworks and approaches that at times might appear confusing. One of the aims of the present research was to explore in greater detail conceptual aspects within the social learning literature. To search for trends and themes, an extensive review was undertaken.

To this end we first had to identify the body of work that constitutes the literature of interest, and the systematic review we undertook proved useful because it allowed us to extend the search beyond mainstream journals and identify the literature of interest more comprehensively. Then, in a second step, analytical items to be used for the appraisal of selected literature were defined. To do so, established literature on theory building, research methodology and philosophy of sciences was consulted. Three types of analyses were performed: i) one analysed how the literature has operationalised social learning, ii) one appraised interdisciplinary influences, and iii) one considered methodological choices reported in social learning literature.

This first section introduces the process of literature selection and data extraction, and detail on how the analyses were performed is given in the corresponding sections. Additionally, in this first section, a general description of the selected literature is given, and some aspects of interest are noted.

2. Methods used for literature selection and analysis

Before giving detailed methodological information it is useful to clarify that the analyses discussed in this document were focused on one application domain only i.e. natural resource management. Thus, literature which focuses on environmental policy, policy tools and appraisal methods, and only marginally touches upon natural resource issues goes beyond the scope of the research discussed here and was not included.

Research on social learning and natural resource management has been published in books, journal articles, reports, web-pages and other outlets. For that reason, it was necessary to identify the literature of interest and a decision was made to focus on peer-reviewed literature only i.e., journal articles. Then advantages and disadvantages of different appraisal methods that can be used in review of scientific literature were considered.

Keeping in mind that publications on social learning do not use shared research protocols or comparable methodologies, a meta-analysis, which appraises research that uses comparable research designs, was seen as problematic. Alternatively, a *systematic review*, which allows the evaluation of research that is qualitative and descriptive and that does not use comparable research designs was better suited for this task. Established literature on systematic reviews (e.g., Petticrew and Roberts, 2006) was consulted and the following steps undertaken according to guidelines. First, the inclusion and exclusion criteria used to select the publications were defined. The inclusion criteria chosen for the appraisals reported in section one, two and three were: (i) *quality* (i.e., publications should be peer-reviewed) and (ii) *relevance* (i.e., publications should use social learning within the applicative domain of natural resources management). Only one exclusion criterion was used: (i) *consistency*. Therefore, publications that mentioned the term within the title, abstract or keywords, but did not use it subsequently in the conceptual or empirical part of the study had to be excluded.

In a next step two people searched in bibliographic databases (Web of Science, Scopus) and used the following key words: *social learning* and *learning* used both alone and in combination with *natural resources*, *resource systems*, and *resource management*. The hits displayed were examined by checking titles, keywords and abstracts and those papers that seemed to be using social learning in a natural resource management applicative context were selected. The date of the last search was 10th November 2010, and publications available after that date are not included in our study. From this point forward we operated with full papers which at this stage were 116. Then, full papers were checked against the inclusion and exclusion criteria. Fourteen were excluded because the concept appeared in the publication but was not elaborated upon or used in a concrete way. Five were editorial notes introducing a special issue, and these were also excluded. Several of the selected publications reported on the same study/research project. However, contrarily from what established methodological literature would suggest about multiple publications we decided to retain all of them for the appraisals reported in section one, section two and section three. At that stage we had narrowed down the sample to 97 publications that were used as data points. On the other hand for the analysis of methodological choices reported in section four multiple publications were excluded. This resulted in a sub-set of 54 journal articles. Retrieved material comprised original articles, reviews and reflection notes.

The process of data extraction relied on a data *extraction form* (Annex I, Annex II) prepared beforehand. The part of data extraction that is reported in this first section includes bibliographical information, the type of natural resource and its geographical location, type of research and application etc. (Annex I). The part of data extraction that is reported in section three detailed theoretical influences (Annex II). A data *extraction form* was used also for the analysis of methodological choices (Annex III). On the other hand, research reported in section two used a somehow different approach. That part of the appraisal was descriptive and instead of using codes it extracted text from selected publications. Thus, the process of data extraction resulted in three quantitative datasets (one focused on general aspects, one on borrowing practices, one on methodological aspects) and in one qualitative dataset.

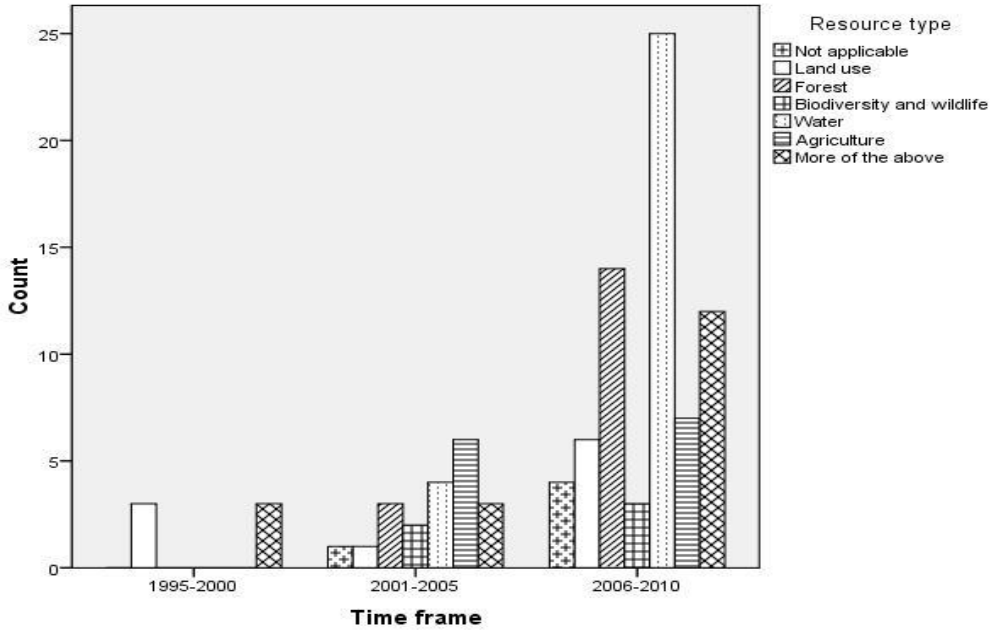
Limitations

Systematic reviews are a useful appraisal method but are not completely immune to criticism. For instance, by focusing on bibliographic databases, some publications, such as books, proceedings, dissertations, and regional non-English journals, are excluded from the review. For an emerging research domain like social learning, this leaves out a substantial number of potentially useful source material. It is not unusual for new ideas and alternative and novel approaches to be presented at conferences and workshops, where comments from an extended peer community are sought in addition to disciplinary-bounded departments. New ideas or methods are often tested in dissertations and research projects. By focusing on bibliographic databases, this type of material has been excluded. The potential to include material not accessible through bibliographic databases was considered, but it was not attempted because we could not identify a systematic way to retrieve it. A second limitation of this research method relates to the appraisal process since it could be influenced by individual subjectivity. To minimize bias, a *review protocol,* detailing the steps and procedures, and a data *extraction form,* were used. In addition to this two coders undertook the data extraction for the part of research reported in section four.

3. Results

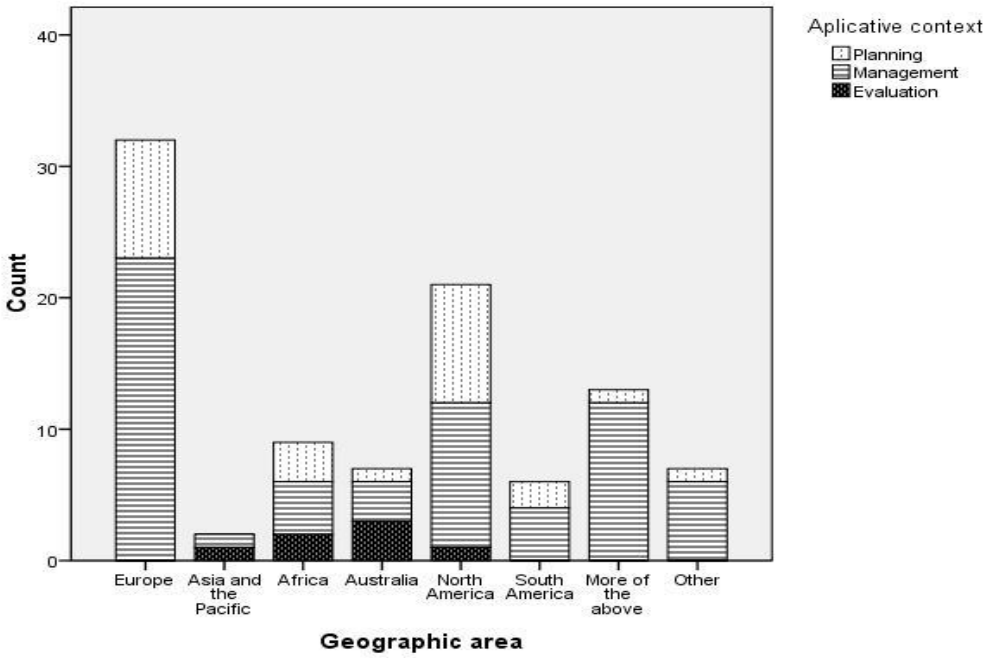
In result to the above described procedures 97 journal articles were selected and constitute our research sample. A large majority of this literature is empirical (81), reporting on findings obtained through case studies, tests of tools and management approaches, field experiments and other types of empirical research. Conceptual publications (16) included reflection notes, literature reviews, and lessons learned. Figure 1 shows the distribution of papers by resource type over the last two decades; an increase in the number of papers discussing certain types of natural resources (e.g., water and forest) can be observed. This includes water systems (29), forest systems (17), agriculture and rural development (13), land use (9), and biodiversity and wildlife (5). Figure 2 shows the distribution of geographical regions where empirical research has been conducted included. Namely Europe (33) and North America (21), followed by Africa (9), Oceania (7), Latin America (5), and Asia (1). The category More (14) comprised studies including more geographical regions, while Other (7) included studies not focused on a specific geographical region**.** In this it is possible to notice that some types of natural resources and geographical regions seem to prevail. Also, figure 2 suggests for another aspect as publications reporting on social learning in relation to evaluation are present in some regions, but absent in others.

Figure 1: Distribution by type of natural resource



In terms of the applicative context, publications focused primarily on resource management (64), planning (inclusive of games and environmental assessment) (26), and monitoring and evaluation (7).

Figure 2: Distribution by geographical area and by applicative focus



4. Discussion: description of selected literature and identification of some general trends

Data extraction suggests that social learning research is issue-driven and closely connected to current environmental issues. All of the empirical publications, except for two that discuss an agent-based model, report on real-world cases and discuss concrete issues in relation to natural resource management. Social learning is used to investigate a variety of natural resource systems; however, results indicate that some types of natural resources and geographical areas prevail over others. This last rather than a characteristic of the social learning research *per se,* could be understood against current trends in research and policy. Twenty-seven publications from our reference dataset acknowledged funding under the European Commission Framework Programmes. More precisely, this can be linked to the type of research project papers report about, such as large cooperation projects with a geographic focus (e.g., Europe) and thematic focus e.g., water management. Twenty-two of these publications have reported on water management cases, while 5 focused on other types of resource systems (e.g., forest and agriculture). More precisely, the abundance of cases looking into some types of natural resources and geographical areas can be linked to the kind of research projects these report about, such as large cooperation projects with a geographical e.g., Europe, and thematic focus e.g., water management. In this regard, Van den Hove's (2007) discussion of science-policy interfaces is of interest. She makes the point that, in the European Union, issue-driven scientific research is preferred, and the way policy domains are prioritized at the political level has implications on the funding of scientific research. All of the publications that have reported on European water management cases and are co-funded under European programs make a direct link between the research performed and the implementation of the Water Framework Directive. Thus, the abundance of water management cases could be understood against policy prioritizations at the European level, which in turn could also suggest that policy and praxis are now opening-up to alternative learning-based approaches in this geographic area. However, a more detailed appraisal of how science policy is currently positioned with regards to alternative and learning-based resource management approaches across different geographic areas is beyond this discussion. Yet, such an appraisal could raise some interesting questions for reflection and could help to further explain differences in the geographic distribution of social learning research found (i.e., Europe and Canada outnumber the others).

Specific implications can be drawn from the type of assumptions made about the nature of social learning processes. We noticed that most publications (81) discussed social learning with regards to interventions, brought from outside the communities, such as participatory workshops, simulation games, community development initiatives, etc. On the other hand, social learning was discussed in relation to processes, developed from within the communities, such as farmers' networks (e.g. Nerbonne et al. 2003, Rist et al. 2003), and local management systems (e.g. Kendrick and Manseau 2008, Olson et al. 2004), in a smaller group of publications (13). However, it is recognised that the type of activity under investigation may not always reflect the assumptions made about the 'nature' of social learning processes. In order to appraise how the literature positions on this aspect a further

step was made by including an item meant to map out whether social learning is understood as an emergent process, which is subject to unpredictability and inclusive of unintended consequences (e.g., failure), or whether it is understood in more deterministic terms of cause-effect dynamics, thereby being linear and predictable. The allocation of publications within one of these two characterizations was performed based on the definitions provided from within the papers. For those publications where this was not exhaustive, the criteria used to assess social learning and the statements made about it were considered. Therefore, we found that most publications discussed social learning as a linear process that can be purposefully facilitated (69), while others discussed it as an emergent phenomenon (28). This part of the appraisal was the most difficult. Several publications provided loose definitions and did not report on the criteria used for the assessment of social learning, or they did not clarify how the criteria were chosen. Therefore, this result constitutes the weakest part of the appraisal. Yet, the process provided some useful information, for instance it informed about the practices used, or a lack of these, applied for the assessment of social learning.

Natural resource management literature is praxis oriented: it is focused on contemporary resource issues and real world-cases. Thus, the abundance of papers reporting on empirical research (81) relative to papers focussing on conceptual and epistemological aspects (16) is not surprising. The accumulation of empirical cases is a positive development; empirical cases provide insight into current environmental issues and can improve our understanding of how interventions can trigger and/or support social learning. Conversely, the scarcity of conceptual research is not very encouraging for a discourse in its early stages, where some questions need to be raised and other questions need to be answered. In the case of a newly emerged research topic, the expectation would be for a research core with a theory-building agenda to be developed. However, only 16 papers from our dataset were centred on conceptual aspects.

5. Conclusions

In this first section the body of selected literature that constitutes our sample was described and aspects of interest highlighted. For instance it was highlighted that some types of natural resource and geographical locations prevail over others, which we assumed could be linked to funds availability and science-policy collaborations present in some regions but not in others. Also, we noticed that empirical papers reporting on real world cases and examples from the field prevail over conceptual papers. The abundance of empirical cases is explained by the fact that natural resource management is very much a praxis oriented field. However, on the other hand, we cannot neglect that theoretical insights are needed as can guide research by providing a basis upon which choices can be made. In the absence of this, the researcher is confronted with additional challenges, including the positioning of empirical insights that emerge within the larger discourse, the contestation of assumptions held and the placement of novel ideas. This, in turn, leads to fragmentation of the research and contributes to a discontinuity in the advancements made. As highlighted by Reed et al. (2010), social learning is a conceptual construct that seems to have taken many meanings; some authors use it when critiquing reductionist and

top-down approaches to resource management, while others use it when placing expectations and value statements. While numerous assumptions and frameworks exist, it seems that only a few have been critically appraised.

Section two:
The emergence of three research perspectives

1. Introduction

The purpose of the analysis reported in this section was to survey the development of social learning literature from the early studies to the most recent ones, paying attention to the aspects that can help to understand the conceptual development of the social learning literature. The main objective that guided this process is: how is the conceptual construct of social learning defined and used by the resource management literature? To this end, the literature was appraised along three analytical items: (1) *characterizing features*, (2) *level of analysis*, and (3) *operational measures*. The first explores aspects that relate to the learning process and was broken down into two questions i) how the literature understands the social learning process, and ii) what the assumed outcomes of this process are. The second deals with aspects that aim to identify 'what' is being investigated. In this, we shall clarify that a distinction was made between the unit of observation i.e. the level at which data is collected, and the unit of analysis i.e. the level at which conclusions are drawn. In addition, the third explores the issue of how social learning is made operational.

The following further methodological detail is given. Then, research results obtained are presented and discussed, and in the last section some concluding remarks given.

2. Methods

Literature used for this part of the appraisal consisted of the same 97 journal articles selected by following procedures as described in section one. Data extraction process relied on the above indicated three analytical items; the first one indicating conceptual elements and the other two for methodological aspects. The assumption was that the three together could signal for trends and could help to identify similarities and differences in how the term is used. Then a thematic analysis was performed and data approximating similar concepts grouped together. This helped to discriminate between papers and some trends could be identified. In this, the allocation of selected papers within the three groups was not always straightforward. For instance in some publications it is assumed that social learning leads to change processes that are of a wider societal relevance but then only data about individuals' learning experiences are analysed and reported, that is, there is a is a missing link between the assumptions advanced with the methodology used. In such cases it was not possible to discriminate on the basis of conceptual and methodological aspects together. Hence, a decision was taken and priority given to aspects of research design and publications falling within the above mentioned case were allocated in the first group. Review papers are also challenging as these examine the work of others. For reviews attention was placed on how these position against the term (and not against the literature); for instance the definition of social learning given by Reed et al. (2010)

emphasises networks and communities of practice and for this reason we understood this publication fitting well in the second group. Muro and Jeffey (2008) after examining the literature unveil their position stating that social learning is experienced by stakeholders when these come together and because they emphasise the role of participatory workshop, and the implications workshops have for the participants, this publication was seen fitting well in the first group. However, it is recognised that focusing on different aspects, and consequently applying other analytical items, could produce different groups.

3. Results: three research perspectives

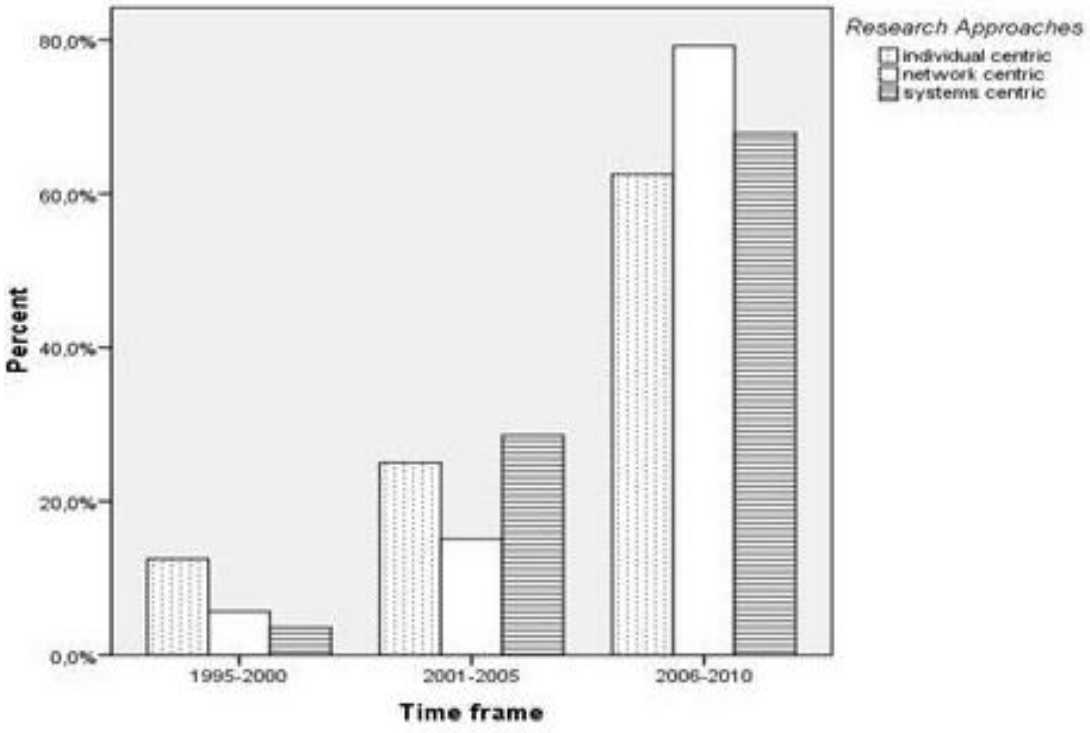
The appraisal of publications against the outlined analytical items allowed for a comparison of how the term is used and suggested that publications can be clustered into three groups (Table 1). Hence, a first group of publications in our reference dataset assumes that social learning is triggered when different stakeholders meet and engage with one another at a participatory workshop, or similar, and occurs when a change is manifested within the cognitive, moral, relational and trust dimensions of those in attendance at the session. This first group of sixteen publications was named individual-centric. The findings indicate that a second group of fifty-three publications had an interest also in other types of settings, such as groups, networks, and associations, and were focused on changes in practices resulting from practitioners' engagement in such networks. This group was named network-centric. On the other hand, a third group of twenty-eight publications had an interest in social-ecological systems emphasizing learning as an emergent property with implications for the social-ecological system. This group was named systems-centric.

Table 1: Three research approaches to social learning: main characteristics

		INDIVIDUAL-CENTRIC	NETWORK-CENTRIC	SYSTEMS-CENTRIC
CHARACTERISING FEATURES	LEARNING PROCESS	Transformative: learning as a transformative process that occurs during a participatory activity and involves the individual.	Experiential: learning as a process embedded in past experience, and/or observation of other practitioners.	Emergent: learning as an emergent property of the socio-ecological system.
	LEARNING OUTCOMES	A change of participants' internal-reflective processes; a change of participant's behaviour.	A change in of established resource use or management practices.	Shift of the socio-ecological system on a more sustainable path.
LEVEL OF ANALYSIS	UNIT OF OBSERVATION	The individual	The individual, network, multi-stakeholder platform.	The individual, ecosystems, institutions.
	UNIT OF ANALYSIS	The participant.	Networks. Multi-stakeholder platforms	The socio-ecological system
	LEARNING AGENT OF INTEREST	The individual who participates to a participatory workshop.	The practitioner, member to a community of practice and/or network of practitioners	The stakeholder, community member or practitioner who is involved in resource management.
OPERATIONALIS.	OPERAT. MEASURES	Moral dimension (civil virtues), cognitive dimension (improved underst. problem domain), relational dimension (relational base), trust (trust towards participants, process).	Change in how things are done. Improved relationships	Change of institutions and management practices at higher levels (e.g. policy), with interest for ecosystem responses.

Figure 3 summarises the distribution of papers falling within one of the three identified research approaches over the last two decades. The category termed “network centric” has the highest increase in the number of papers published in the last five years period.

Figure 3: Distribution of clusters of publications



Earlier some had already commented on the literature approaching social learning in different ways. For instance, Armitage et al. (2008:86) distinguish between research that emphasises learning through partnerships and research that emphasises “the need to understand individual learning”. Also in the response of Reed et al. (2010) to Pahl-Wostl (2006), along with ten other articles published in *Ecology & Society*, different perspectives to social learning are identified. However, since their discussion is based on claims that a shared definition of the construct is needed, differences and similarities between research perspectives are not elaborated in detail. This analysis aims to take the discussion further by summarizing and highlighting key aspects

3.1 An individual-centric perspective

Characterizing features

Findings indicate that a group of 16 publications share a strong interest in participatory processes and advance the assumption that social learning occurs when stakeholders in the course of a discussion become engaged with one another. It is within this first group of literature that an early attempt to conceptualize social learning in relation to natural resources issues is found. For instance, Webler et al. (1995) bring together participatory democracy (e.g. Barber 1984, Fiorino 1990) with behavioral psychology (e.g., Bandura 1977) in a *Cooperative Discourse Model* applied to an empirical case where citizens took part in a series of participatory workshops (i.e., siting of a landfill). In their research, social learning has been operationalized as *moral development* and *cognitive enhancement* that the participants experience and has been used as a criterion to assess the participatory process. Empirical evidence was found for both. With this study, by reaching upon behavioral psychology, Webler et al. (1995) introduce a perspective on participatory resource management, where the emphasis shifts from the *outcome* to the *process* itself. Their study highlights process characteristics, the influence this has on the internal-reflective processes of those attending the session and the transformative change resulting from it. This work has influenced later conceptualizations of social learning and has brought forward expectations about the type of outcomes a social learning process can yield. Based on this work, several research teams have drawn from these insights and similarly have looked at social learning in relation to workshops, or other formally organized settings (e.g. Fitzpatrick et al. 2008, Schusler et al. 2003). However, later research differently from Webler et al. (1995) does not use social learning as a criterion to assess the participatory process. Instead, it is understood to be the desired outcome in itself and the participatory processes the means to this end.

Level of analysis

This research found that 15 out of 16, are empirical papers reporting on real world cases, and one is a review paper. Publications report on issues of land use, forest management, river basin management, and wildlife management where participatory approaches were used. Publications report about investigations undertaken to gather evidence about the type of changes processes participants in participatory processes have experienced. The unit of observation is the individual who took part in participatory activities and hers/his learning experience is investigated with a questionnaire and an interview in order to establish whether learning has occurred and whether it led to the assumed type of change (transformative process). In this, given that publications advance conclusions about social learning which centre on the learning process individuals have experienced we concluded that participants are also the unit of analysis, and have clustered publications accordingly.

Operational measures

The way in which conceptual constructs are made operational has implications on the opportunities for replication and verification of the assumptions. We find that in some of

the 16 publications clustered within this individual-centric perspective social learning has been operationalized as a change in one or more dimensions as suggested by Webler's et al. (1995); 12 out of 16 publications have operationalized social learning as a process that results in a change in the cognitive, moral, relational, and/or trust dimensions. The assumption these publications share is that the participant, as a result of being involved in a participatory workshop, or other similar activity, learns about the issue under discussion, learns how his/her own interests are linked to those of others, and develops or strengthens relationships. Publications suggest that a change in these dimensions constitutes the basis upon which a transformative process of change involving the individual can unfold.

Additionally, in 8 publications it is stated that social learning processes lead to a change in behaviour but this was not made operational nor empirical evidence for such change provided within these publications. Other 6 publications advanced assumptions about social learning and change processes which involve the society at large, but also this was not operationalised or empirical evidence provided.

3.2 Network-centric perspective

Characterizing features

A second group of 53 publications has focused on activities other than formally organized participatory workshops. Participatory processes are still a recognized and important aspect but publications are not limited to workshops and expand to include networks of practitioners, user groups, village communities, associations, etc. Compared with participatory workshops, these activities generally include a larger number of participants, cover a longer time-frame and involve those with a specific interest (e.g., farmers, fisherman) rather than the general public. This last aspect is of particular interest to this group of literature. Specifically, these publications focus on the type of group dynamics that is conductive to a change in how things are done. In this sense, we should note that, for this group, the research interest in change processes goes beyond the immediate activity being investigated (e.g., networking) and beyond the internal reflective processes of the individual network member.

We noticed that a substantial number of publications share the assumption that learning within such networks is rooted in experience and is shared between other members, which makes learning meaningful and embedded within the context of where the learner comes from (e.g., farming, fishing). Similar ideas are found in Wenger's (1999) work on the Communities of Practice (CoP). It is not surprising that 12 out of 53 publications have drawn from Wenger's (1999) research on CoP. Wenger (1998) has an interest in applicative domains other than resources management (organizations and management), and he frames social learning in ways that are different than those found in the resource management literature. His influence on the social learning discourse, however, is mediated by those who use his CoP framework. On this point we find useful to draw on Blackmore's (2010, p 204) comment, where she outlines a few differences between the two: **"***Both Woodhill and Ison are concerned with collective learning and concerted multi-level action which they see as essential in their domains of practice, which include*

development, environmental decision making and natural resource management. In contrast, Etienne Wenger's CoPs-based theory.../… is as much concerned with individual as with collective learning and has been applied, in different ways, in a very wide range of domains. Wenger proposes a social theory of learning rather than a social learning theory. He distinguishes this theory by defining learning as a social and historical process. In considering social learning systems his focus is specifically on CoPs, where effectiveness of these communities depends on the strengths of their structural elements of domain, community and practice."

Level of analysis

This research found that 44 out 53 are empirical papers reporting on real word cases with the exception of two, which discuss an agent-based model. Publications report on cases of land use (3), forest management (11), biodiversity and wildlife (2), river basin management (19), and agriculture (10). Nine papers have a theoretical core, or report on lessons learnt.

This second group of publications is not locked within learning processes individuals have experienced since publications expand the discussion to include management practices and related activities. For instance McDaniels and Gregory (2004) report on a multi-stakeholder process in British Columbia (Canada) where they clarify that no formal analysis of learning was conducted and for that reason no conclusions could be offered on this. However, they point to new circumstances that resulted from the process (i.e. resource use and flood control) and see these as evidence upon which claims about multi-stakeholder processes and social learning could be advanced. Also Schneider et al. (2009) report on change processes that resulted from a multi-actor collaborative activity and describe learning processes those participating in the activity experienced. Both, change processes and learning, are used to advance claims about the potential multi-stakeholder platforms have to foster social learning. It follows that while the unit of observation is still the individual about whom data is collected, the level of analysis of this second group of publications changes to include higher levels of aggregation, e.g. the network, multi-stakeholder platform. It is about the potential these settings have to foster social learning that research falling in this second group has drawn conclusions.

We noticed that often empirical research from this group has reacted upon secondary data in search for evidence. For instance Brummel et al. (2010) surveyed planning documents in search for evidence about post-activity changes and found that new wildfire management actions were proposed. While Frost-Nerbonne and Lentz (2003) integrate qualitative data with newsletters and a video material in an investigation of rotational grazing practices and knowledge generation process of a collaborative team. Evidence collected was used to advance claims about the activities being investigated, change processes and social learning processes.

Operational measures

Of this group, 18 out of 53 publications have framed social learning as a process that results in a change in resource management practices, or in how things are done. Publications

have successfully integrated such assumptions in the research design and operational measures used and have reported changes in management practices and resource use patterns. For instance publications report on activities which led to a change of practices in agriculture (e.g. Frost-Nerbonne and Lentz 2003, Ingram 2010, Kroma 2006), forestry (Standa-Gunda et al. 2003) and wildlife management (Kendrick and Manseau 2008). Additionally, 12 out of 53 publications have drawn on Wenger's (1998) ideas about CoP used directly or indirectly in the operationalization of a social learning framework.

3.3 A systems-centric perspective

Characterizing features

This research finds that a third group of 28 publications takes a different approach to social learning compared to the above two groups of publications and has a more explicit focus on socio-ecological systems, which are defined as a coupled system of humans and nature. This group of publications supports the assumption that social learning is a process involving system-wide change processes. Hence, the interest is for change that moves the social-ecological system towards a more sustainable trajectory.

Level of analysis

This research found that 22 out of 28 are empirical papers while 6 are theoretical papers or papers where lessons learnt are discussed. Also these publications report on real word cases inclusive of e.g. land use (3), forest management (2), biodiversity and wildlife (2), river basin management (8), and agriculture (2), or report about more of the above (10).

A main difference between this group and the second group of publications is in the way change at higher levels of aggregation is conceptualised. Publications clustered in the second group report on cases where the interest was for change in how things are done. On the other hand, publications clustered in this third group extend this to include environmental responses that follow from human interventions, or change in how things are done. For instance Rist et al. (2003) investigated a traditional land-use system in the Andes and in this accounted for institutional, historical, religious and environmental factors. They conclude that in their study the land-use system is the result of co-evolution of society and Nature. Olsson et al (2004:77) define social learning as a collective learning process that 'builds experience with ecosystem change and evolves as a part of the social memory, and it embeds practices that nurture ecological memory'. This process, they continue, is linked to the ability of management to respond to environmental feedback and direct social ecological systems into sustainable trajectories.

Therefore, publications use more than one unit of observation, from which data is collected e.g. wildlife populations, multi-stakeholder platforms, and is used to develop an analysis, with conclusions drawn for the socio-ecological system under investigation. In this, the role of feedback processes acquires importance and some of the selected publications have described the ecosystem dynamics resulting from human intervention (e.g. Rist et al. 2003; Olsson et al 2004).

Operational measures

We noticed differences, within this third group, in how publications have operationalised social learning; some are interested in institutional change while others are interested in environmental responses. Hence, 13 publications out of 28 are focused on actor-oriented processes and operationalize social learning within the elements of institutional change. This research is interested in the ecological properties of the natural resource system, but the core of the discussion is centered on social practices, such as how actors organize, how negotiation occurs and the institutional implications that arise from this. Questions that touch upon power issues and social capital acquire importance, but policy and its role in facilitating social learning processes is also a recurring theme. For instance, Plummer (2006) has investigated the development of co-management in a Canadian river corridor by analyzing how local actors got organized, the negotiations that followed from this and the implications that the collaborative activities had on the institutions overseeing the river corridor. On the other hand, 16 publications out of 28 have placed a greater emphasis on the environmental responses to human activities and report upon changes in the ecological system being investigated. This differs from the previous two groups of publications because here the ecological status of the resource system is central, and a description of the ecological aspects is provided. The influence of systems ecology is perceptible in the way this research discusses aspects pertaining to the natural resource ecology, with special attention on scale issues (e.g., Cumming et al. 2006). For instance, Sayles and Mulrennan (2010) have investigated local hunting practices (e.g., mud dykes and cutting of tuuhiikaan) and described the impact these had at the landscape level.

4. Discussion

The research reported here aimed to gather insight into how social learning is defined and used by the resource management literature. Results indicate that three approaches to social learning have developed, each with own assumptions of what is meant to change and how this is operationalised. This is consistent with what previous studies have already suggested. For instance Reed et al. (2010:2) identify literature that "conceptualize social learning as individual learning that takes place in a social context" and other literature that conceptualises "social learning as a process of social change in which people learn from each other in ways that can benefit wider social-ecological systems". Similarly also Armitage et al. (2008) identify differences between social learning literature and link these differences to the learning theories scholars borrow from pedagogy and cognate fields, given that some emphasise individual learning others group learning. This could be extended to our results. Several of the above illustrated differences between groups of literature could be explained against theories that scholars have brought together. As already indicated the influence of participatory democracy on the first group of literature, the influence of Wenger's (1999) CoP on the second group, and the influence of ecology and soft system thinking on the third group of publications can be seen in the assumptions publications advance about what is meant to change and in the operationalisations used. This is an aspect of research interest which was investigated with a further analysis reported in the next section where interdisciplinary influences are surveyed in greater detail.

In their analysis of social learning literature Reed et al. (2010) identify the need to distinguish between the conditions or methods that facilitate social learning and the potential outcomes of a social learning process. We share this position and a focus on aspects of research design helped to map out what the literature says about the methods to facilitate social learning and the outcomes. Hence, this study finds that most publications discuss social learning with regards to interventions as are e.g. workshops, multi-stakeholder platforms. Indeed interventions constitute a fertile ground for exploratory research since with a suitable research design, effects could be appraised and assumptions verified. However, only a few have chosen to do so. Moreover, in several cases we noticed that the appraisal of social learning falls behind other objectives as for instance the evaluation of the participatory process, which is a legitimate choice, but on the other hand raises questions about the suitability of such an appraisal for advancing claims about social learning. In this, when the method used was meant to evaluate other processes a need emerges to justify how this contributes to understand social learning, in particular when aspects meant to look at social learning were not included in the research design from the beginning but added at a later stage. This is also an aspect of research interest which raises questions about methods/approaches suitable for the study of learning processes in a resource management context. Aspects related to research methodology were investigated in a separate analysis reported in section four.

On the other hand, a focus on interventions brings up specific assumptions about the nature of social learning processes. For instance, in several publications, interventions, such as participatory workshops, are discussed as being the tools to trigger social learning, and in some cases, interventions were described without further elaboration upon the contextual aspects that may have an influence. In this sense, when publications discuss social learning in terms of a cause-effect dynamic, a tension may be identified with the rationale that led to social learning research in the first place. Much of the social learning research frames an explicit critique of the reductionist rationale, which in resource management resulted in technical end-of-pipe solutions (Pahl-Wostl, 2002). This critique recognizes the role of social and institutional aspects, complexity and uncertainty which characterize environmental issues. However, some publications report on interventions which led, or should have led, to social learning with little or no discussion of the contextual elements involved. This tension, we assume, could be understood against the under-nourished theoretical agenda that currently characterizes the discourse.

At this point, having outlined some trends and highlighted aspects which are seen to characterise the discourse along three research approaches, a legitimate question may arise; how generative is that research with an interest in social learning, as an alternative approach for coping with current resource challenges, is pursuing different research agendas? Reflecting on this examination, it is useful to postulate that the type of change process of interest to this literature is difficult to theorize. Large-scale phenomena, such as the transition to a more sustainable world/path/future, which seems to be of interest to research reported in many publications, involves the convergence of a number of different processes, some of which may be linked, while others act independently. In this sense, the process comprises behaviors, practices, and institutions, but also different levels of aggregation (e.g., individuals, communities, regions, ecosystems), and this makes it a

difficult process to theorize. As stated by Geddes (2010), in principle, a multifaceted theory could explain large-scale phenomena; however, in doing so, valuable detail is lost. Her suggestion for an effective accumulation of theoretical knowledge is to focus on individual processes that contribute to the final outcome, with the goal of generating testable propositions. It follows from this standpoint that more than one research agenda could also have some advantages. Nevertheless, social learning research is in its initial stage and as interest in these alternative approaches develops, many aspects will need to be negotiated, agreed upon and theorized.

5. Conclusions

Social learning is conceptualized, understood and used in many different ways, thereby resulting in some criticism. However, this part of the analysis suggests that research shares several features on which basis can be clustered into three groups, or research perspectives, each with its own assumptions about the learning process, learning outcomes and operational practices. Hence, publications that are identified as taking an individual-centric approach suggest that social learning is triggered when different stakeholders meet and engage with one another at a participatory workshop, or similar activity, and occurs when a change is manifested within the cognitive, moral, relational and trust dimensions of those in attendance at the session. Publications that are identified as taking a network-centric approach extend this to include other activities, such as forums or other type of collaborative meetings, and suggest that social learning is triggered when practitioners and members of a network or an association engage with one another and share their experiences and knowledge. These studies recognize the role of a participatory process but are not limited to it. These publications discuss social learning in relation to a change in how things are done (e.g., management practices). Conversely, those publications that are identified as having a systems-centric approach discuss social learning as a change process that moves the socio-ecological system on a more sustainable trajectory. This literature touches aspects of governance and structural change but also provides a description of the resource system and ecological status and considers the environmental responses to human interventions.

Building on this analysis, we propose that if social learning research is to progress then future studies should build upon both, the theoretical and the empirical agenda. Future research could contribute to the theoretical agenda by addressing ontological and epistemological aspects. If social learning is to be understood as involving a process of change then the field would benefit from further reflection about: what is meant to change; what could be considered as a proof of change; who defines the direction of such change; and what means could help to this end. Second, research could explore research methodologies that allow for a suitable integration, and validation, of the assumptions advanced and also could explore the criteria that can best help in the assessment of social learning processes.

Section three:
Interdisciplinary influences

1. Introduction

An aspect of interest that came forward during the analysis presented in section two is engagement in boundary crossing. That is, most of the literature surveyed reports on research where concepts, methods and ideas borrowed from other fields than resource management were used to integrate the study of natural resources with additional explanations and/or perspectives. Research teams have crossed the boundaries of a number of fields and have borrowed ideas, models and methods. However, which theoretical traditions have most influenced social learning research and what implications arise from interdisciplinary exchange have not been subject to previous discussions. Therefore it is the aim of the present analysis to survey these influences that contributed to shape the social learning discourse and reflect on how this has contributed to shape the discourse. In the following methodological detail not yet provided above is given, then the results obtained are discussed.

2. Methods

Also for this analysis we surveyed the same set of 97 journal articles which were selected as already described in section one. For the appraisal of borrowing practices reported here, an initial list of two broader fields i.e., adult education, policy sciences and theoretical traditions within these i.e., transformative theory, theory of experiential learning, theory of participatory democracy, were identified based on existing reviews (e.g., Armitage et al., 2008). This list was updated as the process of data extraction unfolded. However, we soon encountered a challenge: selected publications would not include references to one or more theories as we initially thought, but would instead cite an initiator or a leading scholar for the theory of interest. When this was not integrated with citations to other research about the specific theory it suggested that researchers have borrowed ideas from the writings from one scholar only. Borrowing of this type makes it very difficult to capture influences from theoretical traditions understood in a broader sense because the body of knowledge associated with a theory/idea is not always taken into account. As a result, it seemed more coherent to replace the list of theories with a list of scholars or key figures for a given field/theoretical tradition. Thus, columns in the Excel spreadsheet that were previously titled with a theory (e.g., theory of deliberative democracy) were replaced with citations to scholars (e.g., Habermans, Dryzek) found within selected publications. There we recorded citations and made notes about what has been borrowed and how it was used. Only the first author was recorded in cases where selected papers citied multi-authored publications. Also, a decision was made to exclude citations to scholars who are part of the social learning discourse because this would serve other purposes than the study of

theoretical influences. Once the data extraction was completed we looked at recurring citations and borrowing practices. Papers reporting on research borrowed from the same/similar theoretical tradition (e.g., deliberative democracy) were grouped together and compared to one another, and to the rest of the selected papers, in an inductive way. This helped to identify influences and points of tension.

A last step of this analysis involved the triangulation of the results reported here with the results discussed in section two. Both analyses were based on the same set of 97 papers from which information was extracted which makes a comparison possible.

Limitations to systematic reviews have been already introduced in Section one, however, the analysis of interdisciplinary influences suffers from a further limitation as follows. Taking into account the position that academic socialisation has an influence on how we see and interpret data, it might be useful to reflect on how the author's background has influenced the research discussed here. The author has worked before with theories from adult education and policy sciences but not with theories from the other disciplines that this study identified influenced the selected social learning literature (i.e., systems theory). Extensive readings of systems literature and discussions with peers/experts were conducted to balance for this inexperience. Yet, during the appraisal of borrowing practices involving disciplines/theories with which the author was not familiar, it was not always possible to formulate a critique of the same detail as for the borrowing from those theories that the author had worked with before. A similar circumstance occurred for the part of the analysis that involved the influence of science policy because the author is less familiar with circumstances outside Europe, for which extra input had to be sought.

3. Results

This review identified that the social learning literature has been influenced by a number of fields, but some stand out most. These are policy studies, research on learning and systems sciences. Researchers have frequently borrowed from democracy theory, specifically from Dryzek's and Habermas' research. Eleven of the selected publications report on research grounded in Habermas' communicative rationality, while 9 of the selected publications report on research informed by Dryzek's insights on deliberative democracy, sharing the assumption that problems can be best identified and alternatives explored through deliberation. Researchers have also frequently borrowed from research on learning. Bandura's social learning theory was cited in 21 publications, Kolb's experiential learning was cited in 12 publications, Mezirow's theory on transformative learning was cited in 7 publications and Freire's research on emancipatory learning was cited in 6 publications. These theories are focused on individual learning, emphasising either environmental influences or processes internal to the individual, but researchers have also borrowed from learning theories that emphasise group dynamics. For example, Wenger's work on communities of practice was cited in 27 publications as well as Argyris' research on organisational learning was cited in 27 publications. These theories are focused on learning in relation to a group (or broader) context, emphasising change, adaptation and related processes.

This review found that also the research on complex systems had an important influence. Systems science is a heterogeneous field that incorporates a number of approaches and sub-fields; however, how these are classified for discussion seems to be contested. As a consequence, in the present study, we choose to draw from Ison (2007) where he distinguishes between approaches and corresponding scholars. As a result, the present study finds that Holling's research was cited in 24 publications, Folke's research in 18 publications, and Checkland's research in 11 publications. These scholars focused on specific aspects or questions within systems science: Holling and Folke focused on complex systems and systems ecology, while Checkland focused on soft systems methodology. Other systems scholars were cited, but not as frequently. For example, Maturana was cited in 3 publications, Capra was cited in 2 publications and Forrester was cited in 2 publications.

4. Discussion

4.1 Disciplinary influences within social learning research

As discussed above, selected literature has been influenced by policy studies, research on human learning and systems science in substantial ways. The influence of policy studies, and specifically of democratic theory, is observed in the types of normative claims and expectations advanced in some social learning literature. These include claims about the need to open-up decision making and to improve the legitimacy of final decisions. These also include claims as formulated by Röling (2002) and Webler et al. (1995), and later taken up also by Keen et al. (2005), to go beyond the private preferences of individual stakeholders towards a more collective dimension of the problem domain that reflects the stakeholders' needs, expectations and value claims. When applied in a resource management context, the *theory of deliberative democracy* suggests that when stakeholders articulate their needs in the course of a participatory activity as well as their expectations and claims over natural resources, defending these against opposition, this benefits those participating *and* the final outcome (Conrad et al., 2011; Parkins and Mitchell, 2005). In this regard, Habermas' *theory of communicative action* has been frequently borrowed to explain what happens during a participatory process. This theory emphasises "reasoned arguments" and suggests that by articulating arguments for or against a given issue and by being exposed to alternative views, participants become engaged in a learning processes that strengthens civic values and relationships. Deliberative democracy suggests that there are benefits not only to the individual but also for the final outcome, namely that the outcomes produced, or decisions reached, during deliberative processes are of a superior quality to those stipulated behind closed doors. Outcomes produced during deliberation integrate different perspectives, concerns and knowledge and thus also have higher legitimacy.

The social learning literature draws on these ideas and offers some preliminary evidence. For example, Webler et al. (1995) documented a participatory process where space was made for prolonged interaction and reflective reasoning, and there evidence of learning,

strengthened civic values and improved relationships was found. Also Fitzpatrick et al. (2008), borrowed from Habermas and Dryzek, and found evidence of learning outcomes in their empirical case. Thus, it could be summarised that the influence of policy studies, and borrowed theories, on social learning research is in terms of assumptions formulated about "what" can trigger a change process and "the type of transformations" that follow from this for the resource users/participants and the resource system.

Habermas' theory offers a useful lens through which resource management can be studied, but it also has a number of limitations that are not mentioned in the social learning literature that cites his writings. Scholars in policy sciences have already provided a detailed critical review of the theory of communicative action *(*e.g., Elstub 2010, Honig 2007). Only those aspects relevant to social learning research are highlighted here. Thus, a first aspect of interest is that communicative rationality has 'normative' content in the sense that it assumes that all subjects have a position towards the issue under discussion, are willing to defend their position, and shall reach a shared understanding based on rational arguments. This, as noted by Elstub (2010), places a heavy burden on subjects who must have cognitive, social and relational qualities as well as resources (e.g., time) that allow them to participate. The ideal conditions postulated by the theory are useful for theorising communicative interactions, but this will not always be the case in the real world (Elstub 2010; Ryfe 2005). Participants might not have developed an informed opinion, might not be in a position to defend own opinions, or might not be able and/or willing to listen to different perspectives. As a result, the discussion will not always progress on the basis of rational arguments and towards a shared understanding, as is often assumed in the social learning literature. This is a topic of interest in policy studies; while some critically approach the normative content of deliberative democracy (e.g., Ryfe, 2005; Stevenson, 2009), others report processes that unfolded differently than initially planned (e.g., French and Laver, 2009). However, within the social learning literature, little attention has been paid to this, and preconditions of this type or related contextual aspects are seldom critically analysed. An exception is the study of Van Bommel et al. (2009) who critically appraised contextual aspects and elaborated upon the preconditions of a stakeholder platform which did not resulted in social learning. Van Bommel et al. (2009) commented that participants joined the platform with different degrees of trust, willingness and capacity for engagement, and these factors were assumed to have negatively impacted the process. Future research could benefit from further analyses about how differences of trust, power, and inclusiveness, among others, can impact interactions and influence the shared understanding and learning processes. In addition to this, the theory of communicative action has also been criticised for ignoring processes that are external to the deliberative setting. Scholars in policy sciences have shown that this leaves out of the analysis valuable elements that are of potential interest to those interested in change that goes beyond the workshop setting (e.g., use patterns) and also it ignores that forces external to the deliberative setting can have a critical influence on the interactions within it (Dodge 2009; Hendriks, 2005).

This review found that that research reported in selected publications has been influenced by the adult education and organisational development literature. Scholars have borrowed established theories on adult learning to conceptualise the learning processes in a resource

management context. In this, Kolb's experiential learning and Mezirow's transformative learning have been used in the study of learning processes experienced by individuals, while Wenger's research on Communities of Practice (CoP) have informed research focused on communities and networks of practitioners. For instance, Toderi et al. (2007) borrowed from Kolb's experiential learning used in an action research activity with the aim to reduce nitrate pollution in an Italian rural area. While Fitzpatrick et al. (2008) used Mezirow's transformative learning theory to inform their investigation of learning processes in relation to environmental assessment, and Brummel et al. (2010) borrowed from transformative learning to analyse the learning processes in relation to collaborative wildfire protection planning. These studies found evidence of participants being engaged in a learning process. However, of a special interest is that mentioned studies did not operationalised learning as other adult learning literature on transformative learning. For instance thee studies do not give empirical detail about changes in frame of reference (*sensu* Mezirow, 1991). Wenger's work on CoP has also been used widely. However, substantial differences exist between the CoP and the above-mentioned theories, and thus, the influence of Wenger's work cannot be sought in the same areas. For instance Pahl-Wostl and Hare (2004) cite CoP, indicating that it informed their model by giving space for relational qualities. They did not empirically verify this aspect, which was defined in their study as the "capability of the actors in a basin to solve conflicts and come to cooperative agreements" (ibid., p. 194-195). Pahl-Wostl and Hare (2004) claim that the relational outcomes materialised when a forum, where the political figures and citizens could come together to discuss current issues, was created. It follows, that Wenger's CoP, rather than a theory that guides choices of research design, was used to explain collaborative activities of groups and networks.

Armitage et al. (2008) have considered the influence that learning theories have on current conceptualisations of learning within a natural resource management context. This review adds to their discussion by highlighting that the influence of adult education and organisational development literature, on social learning research is prevalently in terms of assumptions about how learning takes place. For instance, both Mezirow's and Kolb's research on learning is centred on individual learning, which results in research highlighting change processes that are internal to the individual. When applied in a resource management context, this influenced the choice of the unit of analysis e.g., the individual who has participated to an event, as is a stakeholder workshop, and of a research interest was if learning has occurred and whether it led to the assumed type of change (e.g., Brummel et al. 2010, Fitzpatrick et al. 2008). In contrast, Argyris' and Wenger's research emphasises performance and outputs. When applied in a resource management context this resulted in research emphasising change of practices or improved management regimes (e.g., Borowski, 2010, Keen and Mahanty 2006). On the other hand, methodological aspects e.g., operational measures, and the discussions of what counts a proof of learning in adult education and organisational development literature seems to be having limited influence on the social learning literature.

In addition to this we found that Bandura's research on learning (located in context behavioural psychology) was also frequently cited: his early research from the 1970s was cited 21 times, while his research from the 1990s was cited 6 times. Yet in the publications

that cite Bandura's research, conceptual insights from Social Learning Theory (SLT), are seldom used to inform the analysis nor are behavioural aspects integrated or investigated empirically with the frameworks used. Thus, the influence of behavioural psychology and SLT in particular appears to be largely nonexistent. Of interest, however, is that in several publications Bandura's research is identified as *not very useful for resource management* or *too narrow to include all learning processes of interest,* this without providing evidence and/or any critical appraisal supporting this claim. It is for this reason that we have some reservations in classifying this as a case of borrowing of terminology i.e., the term. We agree that the early research on SLT is not particularly helpful for resource management but this is because it centres on individual learning processes in relation to one's environment, that involve observation, vicarious reinforcement, and the behavioural responses that may arise from this. More precisely, because it theorises a different process from what seem to be of interest to resource management. In addition, in his early studies, Bandura focuses on children/adolescents whose learning patterns, as andragogy suggests, are not the same as those of adults. However, Bandura's later work from the 1990s and 2000s, which centred on adults, can offer more to the study of learning within a resource management context. For example, his social cognitive theory, which theorises how people acquire and maintain certain behavioural patterns, could potentially provide input for intervention strategies. The Mexican '*Vien Conmigo'* literacy program and the drinking intervention program that involved a quasi-experimental approach constitute interesting examples of community-wide interventions (see Bandura, 2008). Both programs were implemented in communities with the aim to change negative practices, resulting in encouraging results regarding the intended outcome (i.e., improved literacy and reduced alcohol consumption, respectively). This is not to defend his recent research but to point out a trend in how certain disciplinary boundaries are crossed and how the items borrowed are then used, or not, to inform current research.

This analysis found substantial influences also from systems sciences. The research reported in selected publications supports non-reductionist approaches; includes system-wide dynamics and feedback processes; and considers the implications of learning at multiple scales. Many of these points of attention have origins in the systems approach to scientific research, which *embodies a shift away from a* narrowly defined issue to a more holistic approach that accounts for the context, scale and insight from more perspectives. Specifically, it seems that two currents within systems sciences have had most influence. One can be tracked to Holling's and Folke's research and centres on complex adaptive systems. This position investigates how relationships between parts give rise to complex behaviours and assumes that systems operate at multiple scales with non-linear interactions such that emergent properties and self-organisation jointly contribute to unpredictability (Holling and Gunderson, 2002). A second one can be tracked to Checkland's research and centres on a novel methodology. This position emphasises reflective inquiry, context specific characteristics and the role of meaning making (Cundill et al., 2011). Our analysis suggests that the influence of systems literature on social leaning research is within aspects of research design and methodological choices being made (i.e., the type of questions being asked and the steps taken to answer these). Several of the selected publications indicate an interest in adaptive systems, in feedback processes and in scales, and use insights from soft-systems methodology. For example, research conducted

within the Harmonicop project centred on participatory river basin management and aimed at “identifying barriers and supporting mechanisms for social learning’’ (Tippett, 2005, p.291), including empirical cases covering a range of different scales (Mostert et al. 2007). Systems thinking played a key role in a further project on social learning (i.e., SLIM). In this case, the phenomenon of interest, namely change in water management practice, was deconstructed and similarly investigated with empirical cases from across several countries (e.g., Ison and Watson, 2007; Steyaert et al., 2007). However, rather than producing large-scale comparisons between cases for establishing generalised relationships between variables, the research discussed in this papers aimed at producing detailed descriptions of individual cases. The aim was to improve the understanding of how “complex units” work in order to inform future practice.

Ison (2007, p. 152) highlights that “systemic understandings enable reflections on the nature of research practice”, while Barton et al. (2009) point that action research has it foundations in systems thinking. Both discussions help to centre the attention on further influences by highlighting that a systems perspective is underpinned by an ontological position that allows the researcher to be engaged in action as a form of inquiry. In several of the selected papers it is reported about projects where researchers have taken an active role. For example, Toderi et al. (2007) report about their involvement in a learning process jointly with other stakeholders indicating that later this influenced how they perceived the issue under investigation. Thus, it can be assumed that in parallel to influences on methodological choices, systems science literature has also influenced the role (some) researchers see for themselves in social leaning research.

As already mentioned in reviewing the literature differences emerged as to how researchers engaged with the insights borrowed; often, the insights borrowed were not considered against the body of knowledge associated with the theory chosen. This means that established operationalisations of borrowed constructs and critiques were not always taken into account, nor were advancements integrated in the analysis. As discussed by Klein (1996), boundary crossing can be performed in many different ways and can serve different purposes. It is driven by an underling critique of established approaches/epistemologies, seen as insufficient or out-dated. This can include the borrowing of terminology and ideas or can encompass methodological thickening and theoretical enrichment (Klein, 1996). Yet, boundary crossing is a challenging activity and Klein (1996) gives an account of the difficulties involved. Ontological and epistemological gaps are on the top of her list. The above mentioned Bandura’s example indicates for certain challenges. An example of a different type of borrowing from this same literature is the study of ethical leadership, where Bandura’s insights informed the study design and were used to operationalise employees’ learning patterns (e.g., Brown et al., 2005; Mayer et al., 2009). This allowed some assumptions to be tested and the role of ethical leaders for employees’ performance to be explored. Yet, the way Bandura’s research is summarised without a critical appraisal supporting the claims advanced, as well as the low engagement with established operationalisations of the theories cited, signal for difficulties researchers experience in engaging with constructs that are different from content they are used to engage with. Thus, we may understand differences in these two cases exposed against the

conceptual distance between the fields involved; this is lower between leadership studies and research on learning than in the case of resource management.

4.3 Heterogeneity of approaches and research interests

In a final step, we triangulated the above discussed with the outcomes obtained from the analysis presented in section two where have highlighted that selected papers differ in terms of the assumptions advanced about the learning process, outcomes and operationalisations, and were clustered in three groups (i.e., individual-centric, network-centric and systems-centric). In triangulating this with the theoretical influences as discussed above it emerges that differences within the three groups can indeed be understood against different choices in terms of what has been borrowed and how it has been used i.e., interdisciplinary engagement. In this, a trend can be observed which crystallises when scholars operating within the same or similar theoretical tradition are clustered together and references to theoretical traditions for each of the three groups of literature are mapped out. To this end, Agryris and Wenger were grouped under theories on group learning; Freire, Mezirow and Kolb under theories on individual learning; Habermans and Dyzek under theories of democracy; and Holling, Folke and Checkland under systems sciences. Bandura (and behavioural psychology) is not included because no influence was found.

Figure 4 Clusters of theoretical traditions across the three groups/ approaches identified (normalized values).

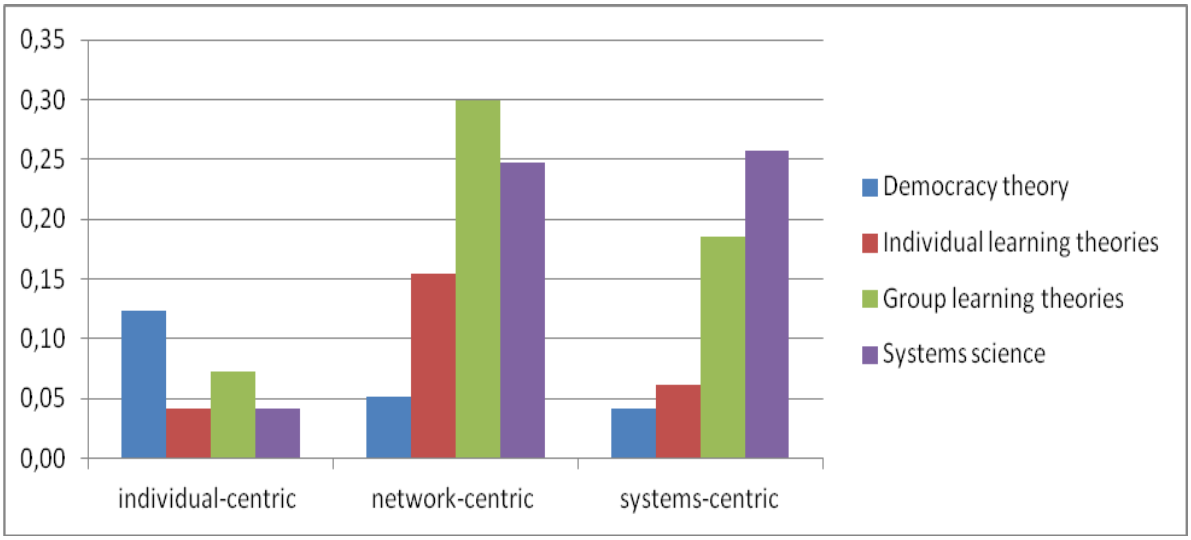
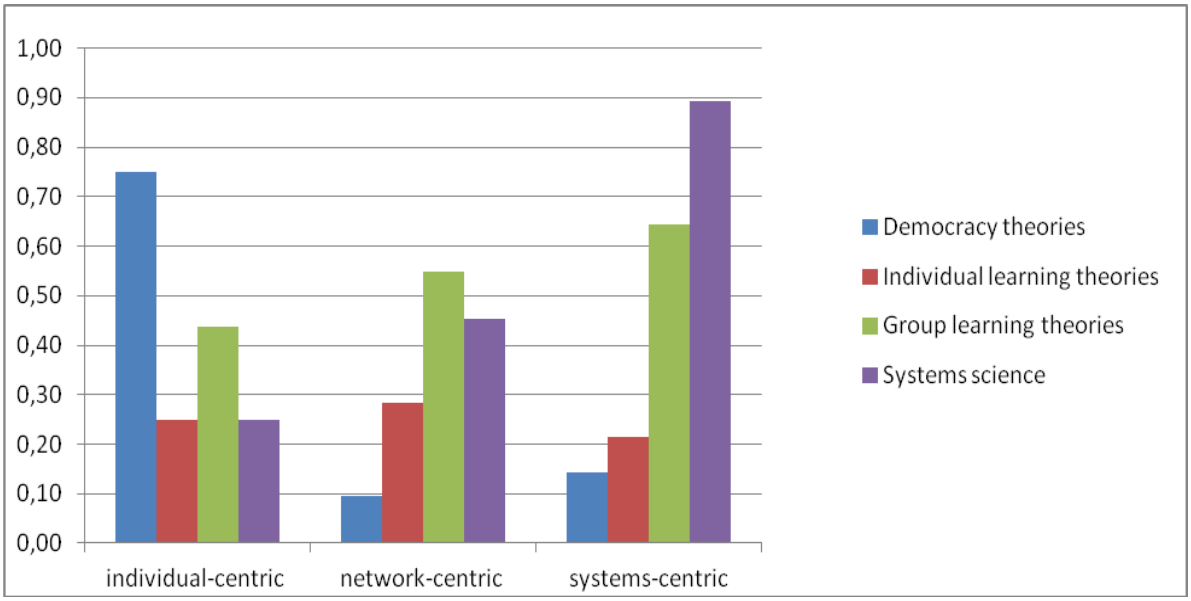


Figure 4 summarises references to theoretical traditions for each of the identified group of literature and it can be observed that some theories are more prominent than others, while figure 5 summarises the identified citations. Therefore, the interest for individuals and workshops stated in publications allocated in the first group, named individual-centric, can be related to borrowing from deliberative democracy. Next, the interest for groups and change in management practices stated in publications allocated in the second group, named network-centric, can be related to borrowing from theories on group/organisational learning where certain types of outcomes are emphasised. Conversely, the interest for change processes and socio-ecological systems, stated in publications allocated in the third group, named systems-centric, can be linked to influences from systems science (Holling and Folke in particular). Thus, differences in terms of the assumptions made about the learning process, learning outcomes and operational measures can indeed be understood against choices in terms of which disciplinary boundaries were crossed, what has been borrowed and how it has been used.

Figure 3 Citations to established scholars across the three groups/ approaches identified (normalized values).



5. Conclusions

This part of the analysis showed that the social learning literature is characterised by interdisciplinary endeavours and by a range of borrowing practices. Also it suggests that boundary crossing underpins the current heterogeneity of conceptual frameworks and definitions found within the social learning literature.

Psychology and adult learning literature highlight that humans are always involved in learning processes, and a multitude of theories attempt to conceptualise the many different types of learning that we experience, e.g., collaborative or experiential. To this, Illeris (2007, p. 12) adds that "learning is always embedded in a social and societal context that provides impulses and sets the frames for what can be learned and how". He points to differences in the nature of the learning processes that take place at school, work, or other settings within our daily lives, highlighting how different contexts create a mix of conditions for learning. Natural resource management is a case in point: across different geographical areas, there is a variety of institutional arrangements, economic implications, livelihood strategies, participating actors/stakeholders and relational dynamics between these factors, which create a variety of conditions for learning. An understanding of how such contextual features either stimulate or hinder learning is of interest, and borrowing from established learning theories could indeed help to this end. Additionally, established theories could help in the study of learning interventions and the extent to which these interventions can lead to desired learning outcomes.

Therefore, it is possible to conclude that future research on social learning could benefit from the investigation of contextual aspects, how, when and under what conditions selected interventions (e.g., participatory tools) can foster certain types of learning, and what learning outcomes can result from the interventions. For instance, are contexts in which resources are managed by state agencies more likely to foster certain types of learning and learning outcomes than contexts in which relational dynamics are steered by local tradition, e.g., common-pool regimes? Are interventions (e.g., participatory processes) designed and delivered by researchers more likely to foster certain types of learning than locally developed initiatives (e.g., community gardens)? What is the influence of relational dynamics, trust and power imbalances on learning? In other words, the challenge for future research is to use disciplinary knowledge in an integrative manner to advance our understanding of learning processes, and hence learning-based approaches.

Part II: Methodological aspects

Section four: Methodological underpinnings[1]

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1. Introduction

In the above discussed analyses aspects pertaining to research methodology were often mentioned. In section two it was indicated that in some of the selected literature the appraisal of social learning falls behind other objectives, while in section three it was mentioned that social learning is seldom made operational. These are aspects of a research interest which were explored in a further analysis focused on methodological choices. To this end we have focused on empirical literature only i.e. papers that report on/use social learning in relation to empirical studies in practice, and have looked at the choices made with respect to the study design, data source and collection methods among others. Since we anticipated a predominance of post-normal approaches (Funtowicz and Ravetz, 1993, 1994b, 1999), we also accounted for the relationship between the researcher and the phenomena under observation. In order to develop a framework for analysing methodological choices we had first to reflect on knowledge production and validation practices that seem to resonate most within the environmental management and governance literature. Thus, in the following four typified categories are briefly summarised. Then some additional methodological detail is provided and the results obtained are discussed. The section ends with some concluding remarks and links the results obtained to possible future directions in social learning research.

2. A reflection on practices of knowledge production

A journey through methodological choices acquires specific relevance when it is accompanied by a reflection on practices of knowledge production and validation. For this reason, we will briefly outline some of the philosophical considerations that seem to resonate most within the environmental management and environmental governance literature. These considerations originate in the sociology and philosophy of science, where by setting certain standards of argumentation, researchers try to reflect on what constitutes scientific research and how it evolves over time. Some of these insights have entered the environmental management and environmental governance literature, and contributed to raise questions about how research about the environment should be conducted and which methodology is best suited to investigate contemporary environmental issues. Several important discussions of these issues can be found within ecological economics; a field that has emerged from critical considerations of the

[1] The outcomes summarised in this section are the results of a joint research effort undertaken with Georgina Cundill and Arjen Wals. I thank both for the collaboration and for allowing the reproduction of text and data from a joint publication.

appropriateness of separating the study of economic systems from the study of ecological systems (Kastenhofer et al., 2011; Norgaard, 1985, 1989; Røpke, 2005; Tacconi, 1998). Ecological economics embraces a pluralistic approach and this allows for critical considerations of current research practices and at the same time offers space for reflections on how research about environmental issues should be undertaken. Funtowicz and Ravetz (1990, 1994b) reflect on changes in contemporary scientific research by considering who takes part in knowledge production and validation and highlight the idea of science as a socially distributed practice where, due to uncertainty and complexity associated with environmental issues, new quality criteria need to be integrated. Tacconi (1998) extends this to include the constructivist approach while Ramos-Martín (2003) makes a link to complex systems thinking. These authors highlight the strengths and weaknesses of different research approaches in the study of social-ecological systems.

Although it is not possible to talk about a clear-cut classification of research approaches that currently characterise scientific research, it is perhaps in relation to knowledge production and validation practices that a distinction can be drawn between the positivist, the interpretative, the critical and the post-normal approach (Table 2). Before giving a brief description of each we must clarify that this is not an exhaustive list. Rather, the approaches listed are typified categories that seem to resonate within the environmental management and environmental governance literature. Therefore, the position of positivism is that reality is given and exists independent from humans. A consequence of this position in research is the separation of the observer and the observed by using the scientific method that includes observation, measurement, experimentation, as well as the formulation, testing, and modification of the assumptions initially stated (Kuhn, 1973; Guba, 1990; Norgaard, 1989). Rigour, quantitative analysis and control over variables are the cornerstones of corresponding scientific methods and the aim is generalisation of the research findings. Kuhn (1973) challenged the idea of objectivity when asserting that scientists work under theoretical frames that are superimposed on the phenomena under investigation. The positivist approach was challenged on additional grounds, for instance; for its assumptions that reality is uniform and unchanging and that knowledge accumulated about an object can be generalized to a wide range of cases (Norgaard, 1985, 1989), for its limitations in managing complex systems that are characterised by high levels of uncertainty (see: Vickers, 1965; Checkland, 1981, 2000; Ramos-Martín, 2003), and for rejecting non-scientific knowledge (Funtowicz and Ravetz, 1999). Several of these critiques are underpinned by an ontological position that postulates that reality is socially constructed and hence can take on multiple meanings.

The position of *interpretative research* is that reality is socially constructed and cannot be captured by single interpretations that all observers, or rather, participants in reality, share. Therefore, the researcher's task is to unveil the interpretations that different groups have of an object, phenomenon or issue. Interpretative research rejects the difference between subject and object and postulates that as we are merged with our world, the way we go about understanding it is influenced by this condition (Heidegger, 1982). Thus, it is relevant to discern where the subject comes from in order to know how she/he goes about abstractions, rationalisations and theoretical constructions (Ricoeur, 1981). This position assumes that knowledge is socially constructed and as such rather than testing

assumptions, the researcher acts as an observer seeking to identify the many interpretations available and to understand if and how these influence each other, and the object of interest. Many schools of interpretative research can be found and a detailed analysis of these is beyond the scope of this analysis. However, it might be worth indicating differences among those cited by the ecological economics scholars mentioned above. For instance phenomenology, whose roots are in a philosophical movement that developed at the beginning of the 20th century, evolved to include a range of interpretative methodological approaches discussed in detail by Moustakas (1994). These include ethnography, grounded theory, hermeneutics and empirical phenomenological research. These share several elements such as the search for meaning and for first-person lived experiences and for this reason these frequently rely on qualitative data that is used to provide a rich picture, for example through the development of case studies based on in-depth interviews, life histories, text and narrative approaches (Creswell, 1998; Alvesson and Skoldberg, 2000; Wals, 1993). But these methodological approaches also share the position that human experience and behaviours are part of the subject-object dialectic and seek an understanding of the wholeness of experience rather than seeking to isolate a part of it (Creswell, 1998; Moustakas, 1994). These methodological approaches do not aim for control upon pre-defined variables, nor do these aim for generalization or prediction (Wals, 1993).

A further approach that has influenced the environmental management and governance literature can be traced to the Frankfurt school of critical theory and has been most intensively influenced by Habermas' writings about deliberative democracy. This approach, which is often referred to as *critical research*, also seeks to unveil the interpretations of reality, but often does so through the lens of power relations (Hart et al., 1994; O'Hara, 1996; Wilson and Howarth, 2002) oftentimes with a normative purpose of overcoming power imbalances and social inequities. Several research methodologies are used to do this. Critical research, in contrast to the interpretative research which tends to engage in naturalistic inquiry (i.e. the study of phenomena in their natural setting), frequently integrates interventions in the study design e.g., participatory workshops. Such interventions are designed to study scholarly relevant questions but it is not uncommon that these seek to fulfil further objectives, such as producing socially relevant outcomes and the empowerment of those involved (e.g. Meppem and Bourke, 1999**)**. In this, the researcher's personal ambitions, values and ethical principles are not excluded from the research inquiry but are rather seen as functional for the research process through which the researcher moves.

A *post-normal approach* was first conceptualised by Funtowicz and Ravetz (1993, 1994a, 1999) who identified features that they saw as characterising contemporary scientific research. Their interest is in current environmental challenges, which they see as being in need of urgent action. Funtowicz and Ravetz (1993, 1994a, 1999) argued that the 'puzzle-solving' approach (*sensu* Kuhn, 1973) to scientific research is inadequate for contemporary environmental and sustainability issues which are characterized by high levels of complexity, uncertainty and contestation (Peters and Wals*, in press*). A "post-normal" approach to research tends to be issue-driven, policy relevant, transdisciplinary and emphasizes "issue improvement". In relation to this last aspect, much of contemporary

post-normal researchers select action research as a mode of inquiry, where the researcher does not operate alone under firmly defined disciplinary domains but is engaged in boundary crossing and collaborates with an extended community whose input is sought during problem formulation, or later, for the purpose of knowledge validation. The researcher is exposed to, and recognises the value of, different ways of knowing and knowledge that can be used during the research process. Funtowicz and Ravetz (1990, 1993) defended the need for a new criterion for research outcomes; that of *extended quality assurance*. Quality of scientific research could be pursed through extended peer communities that take part in knowledge production and/or validation, but the researcher's personal ambitions, values and ethical principles are also functional for quality assurance.

Although these approaches to scientific research differ from one another in many ways, the last three (interpretative, critical and post-normal) seem to share some similarities (Table 2). For instance, they share the position that multiple interpretations of reality (co)exist, and favour qualitative data and cases studies instead of testable propositions to be generalised. Also, these approaches allow for the researcher to take on a different role, compared to a positivist tradition, as she/he moves between being a participant observer to a learning agent, or activist. It can be assumed, therefore, that the choices made about i) *methodology* and ii) *researcher's role* can help us understand the epistemological base of the current social learning discourse, and it is on these two aspects that we base our analysis.

Table 2 Summary of knowledge production practices (input sought in the writings of Funtowicz and Ravetz, Khun, Moustakas, Ramos-Martín).

Dimension	POSITIVIST	INTERPRETATIVE	CRITICAL	POST-NORMAL
Basic goal	*In search of truth*. Build upon current knowledge base and fill gaps in our understanding	*In search of actors' interpretations of the world.* Provide a rich picture of the interpretations of a given issue by different groups	*In search of a transformations.* Provide input for empowering processes undertook by practitioners	*In search of a negotiated agreement.* Provide scientific input for policy and decision-making
The nature of knowledge	Knowledge is universal	Knowledge is contextual	Knowledge is power	Knowledge is multifaceted
Most used mode of inquiry	Scientific method	Phenomenological inquiry	Reflective inquiry	Action research
Reasons for undertaking the investigation	Finding evidence (discovery, curiosity)	Understanding	Empowering	Problem solving
Type of evidence discussed	Mainly quantitative	Mainly qualitative	Mainly qualitative	Qualitative and quantitative
Researcher's role	Neutral outsider	Participant	Learning agent, participant	Advocate, participant
Degree of interaction with other research programs	Lines are tightly policed: disciplinary differentiation	Lines are loose: inter-disciplinary	Lines are loose: inter-disciplinary	Lines are open: trans-disciplinary
Audience	Peer community	Peer community	Peer community, practitioners and society	Extended peer community (stakeholders), policy and decision-makers

3. Methods

For this part of the analysis we focused on empirical literature only (i.e. papers that report on/use social learning in relation to empirical studies in practice) and had excluded conceptual papers as well as multiple publications. This resulted in a sub-set of 54 journal articles reporting on empirical studies in practice. Selected literature was analysed with the aim of disentangling how it positions on aspects related to i) research methodology and ii) the researcher's role vis-à-vis the observed. These two were broken down into sub-questions that informed the development of a code-book used for the data extraction process (see: Annex III).

Data extraction and analysis

A code-book was developed jointly by this research team and used throughout the data extraction process where individual studies served as data points. Data extraction was performed by two researchers who worked with a sub-set of 30 publications separately and later compared their coding results. This helped to identify disagreements in particular for content that was not overtly discussed in the selected literature (e.g. researcher's role). Disagreements such as these can be handled by randomly selecting the coders' decisions, by asking an expert to serve as tie-breaker, or by discussing and resolving the disagreements (Lombard et al. 2002). We chose to identify differences in the interpretation of the two coders and sought a settlement over these. This was extended to the whole sample. For cases where more than one code could be assigned to an item we chose to add additional columns (see Annex III). Once data were extracted we mirrored the results against the dimensions summarised in Table 2 and discussed the anomalies that emerged during the data extraction process.

Limitations to this type of method are known and have been discussed in section one. With the aim to address some of the limitations we took the following measures: more than one person conducted the bibliographic search, a data extraction form was designed by an interdisciplinary team and more than one person undertook data extraction on the same papers. We recognised that it is difficult to argue for objectivity when the appraisal involves non-numeric or poorly described items. In this respect it makes more sense to speak about striving for inter-subjectivity rather than objectivity. Thus, it is recognized that a different team of researchers might arrive at slightly different conclusions than we did. The pool of authors contributing to this research has expertise in different areas e.g., anthropology, education, and natural resource management. This we believe has benefited the process in terms of diversity of perspectives from which to interpret data.

4. Results and Discussion

4.1. Methodological choices

Twenty nine of the 54 papers reviewed declared an explicit interest in furthering our understanding of social learning, and used study designs meant to directly address questions about social learning. On the other hand, 25 studies reported on research that

aimed to further the understanding of other phenomena e.g. the role of multi-stakeholder platforms, and then within this context turned to social learning. This aspect emerged later during data analysis when we began to notice that in several studies hindsight was used. It is relevant to clarify that this second group of studies are not evaluations since they do not use pre-defined criteria but are analyses of social learning opportunities, and related, in retrospect i.e., *ex-post analysis*. These studies draw upon past projects that have come through a full research cycle. In this we observed that several of these ex-post analyses were performed as a reflective exercise, or as an ad-hock explanation, for which secondary data, reports or own experience was used. For instance, some analyses are mainly based upon hindsight where researchers have capitalised on past experiences and have compared in a less structured way how one, or more, past projects performed on social learning (e.g., Bouwen and Taillieu, 2004; McDaniels and Gregory, 2004; Measham, 2009; Shackleton et al., 2009). Others have integrated reflections with the display of field data. For instance Millar and Curtis (1999) searched through interviews, collected for the purpose of evaluating a project for pasture management, in order to gain insight into participants' group-learning experiences, while Schneider et al. (2009) integrated interview data with observational notes, collected for the purpose of project evaluation.

Social learning is a concept that has only recently attracted substantial interest within the resource management community and an explanation for such *ex-post analyses* can perhaps be found in the time lag that is involved in the prioritization of research themes and funding cycles. We could assume that during the early 2000's, when several of these projects were submitted for funding, social learning research was not part of the mainstream natural resource management agenda, and perhaps not a priority for integration in research proposals. Hence, when ideas around social learning began to converge into a discourse in the mid 2000's, those with an interest in *learning* might have turned back to past projects and, as an exercise, tried to assess if, and how, social learning might have played out in the research process or the systems of interest.

The way ex-post analyses are structured and the objectives these aim to achieve can indicate some trends. Ex-post analyses can take on many forms but two are of particular interest here. Ramos-Martín (2003) points out that in environmental economics ex-post analyses are used for the purpose of ex-ante predictions given that an underlying assumption in environmental economics is that the physical system can be described by a universal law, and hence, extrapolating past results they can be used to model future trends. This type of ex-ante study adheres to the positivist approach to scientific research where the aim is control over variables and prediction. However, Ramos-Martin (2003) highlights that when a different ontology is in place and the system is understood as evolving and changing then an alternative approach to research is needed and hence ex-post analyses would serve a different purpose than ex-ante predictions. Then, ex-post analysis can serve as a reflexive inquiry during which the research team tries to (re)describe and (re)interpret data, ideas and concepts by looking at past work with newly accumulated tools and knowledge. Reflexive inquiry allows the integration of more than one methodology and theoretical perspective (Alvesson and Skoldberg, 2000). In so doing, it can shed new light on past environmental issues, perhaps highlighting aspects that were overlooked and in so doing generate new insight for future practice (Rapp Nielsen 2010). In

several of the selected papers, where research takes the form of an ex-post analysis, it is explained that the aim was to bring together past experience in order to highlight the "lessons learned" with specific interest in those aspects that were seen as key elements for social learning. The presence of this type of inquiry, the emphasis on reflection and the interest in re-interpretation of past research suggests an ontological position where reality is seen as socially constructed and taking multiple meanings.

However, ex-post analyses bring with them some challenges. In particular, questions have been raised about the ability of researchers to engage in the interpretation of their own interpretations i.e., the double hermeneutic, (e.g., Alvesson and Skoldberg, 2000; Lincoln, 1995). We searched for strategies that the social learning literature might have used to cope with the double hermeneutic, but were unable to identify any reference to this specific methodological challenge. Selected papers do not give sufficient methodological detail to help us understand if and how the interpretation bias was handled. Nor have they provided information that can help us to deconstruct the methodological choices associated with reflexive inquiry in greater detail. As highlighted by Alvesson and Skoldberg (2000, p.270), reflexivity is not an end in itself but a means to (re)describe and (re)interpret ideas, "it is the ability to break away from a frame of reference". Following from this, it is assumed that a reflexive inquiry will be more fruitful when performed within an inter(trans)disciplinary team given that disciplinary influence, own worldviews, and personal stakes could be more easily identified and compared to that of other team members. In so doing, the risk of subjective and arbitrary representations can be reduced. This study found that the majority of selected publications are indeed co-authored. Hence, we assume that these analyses benefited in this way (e.g., Rist et al., 2007; Schneider et al., 2009; Shackleton et al., 2009).

In terms of data collection methods, the selected studies frequently employed interviews and observation for data collection. For instance, interviews with resource users or stakeholders are used in research reported in 36 papers, followed by participant observation (25), text extraction from policy documents, reports and other archival material (21), and self-reported questionnaires (14). Choices of sample selection indicate that non-random methods were chosen for research reported in 36 papers (although several do not reveal this).

Two issued emerged during the coding of data collection methods. The first issue is that of multiple codes, as in several papers more than one method is mentioned. This was handled by adding columns to the Excel file where this information could be stored (Annex II). The second issue relates to the detail of information that we initially hoped for as it was not always reported in the papers. For this reason then have re-worded and clustered our codes (observation direct=3 and observation unobtrusive=4; interviews structured=1 and interviews semi-structured =2) into general ones as found within the selected papers (observation; interviews), then integrated into the Excel file.

Hence, it seems that qualitative data is preferred and it can be assumed that it is so because it allows for in-depth understanding of the issue being investigated. On the other hand an explanation for this can also be found in the type of phenomenon under

investigation. Learning as a process is not easily measured or captured with quantitative tools especially in relatively uncontrolled, somewhat messy, settings involving multiple stakeholders (Cundill and Fabricius, 2009; van Mierlo et al., 2010).

The choice of study designs also suggests an interest in depth *vs.* breath; 22 publications report on a single case-study, 9 on multiple case-study comparisons, and 2 on experiments, with the remainder being coded as reports/analyses of completed research. Large scale surveys which allow for a certain degree of representativeness, and hence generalization, are not reported in any of the selected papers. Hence, this study finds that in addition to the ex-post analyses the social learning research community is active in single case studies. Case studies allow for historical depth and a fine grained description. Case studies can be used for the identification of causal processes and theory building. However, as Della Porta and Keating (2008) point out, case studies are not very useful for testing hypotheses or establishing relationships between variables. Case studies allow the production of context dependent knowledge. Therefore these, along with the earlier highlighted methodological choices, seem to indicate that research reported in some of the selected publications is focussed on aspects other than testing and verifying the effectiveness of social learning. Rather, it seems that research tries to gather a deeper understanding of learning processes and meaning making patterns, and that often this is performed starting with own (researcher's) experiences in the field. As a consequence the process of knowledge production does not follow an iterative process of formulating and testing assumptions nor is it directed towards finding unequivocal evidence about the performance and effectiveness of social learning processes. This, as pointed out in the introduction, goes against the expectations of some commentators, and perhaps explains some of the criticisms that have been levelled at the social learning literature.

It follows that the above described methodological choices signal that social learning research adheres to a position that allows for multiple interpretations of reality and accepts that context is important. However, contrary to our initial expectations (that social learning research was developing within a post-normal approach), the findings suggest that it is rather tending toward the interpretative and critical research agenda. A post-normal approach relies on transdisciplinarity, that is, the opening up of the knowledge production and validation process to an extended peer-community. However, the methodological choices identified suggest that this was the case in research reported only in a few publications. While social learning research is engaged in issue-driven research and seems to be interested in socially relevant outcomes, it seldom integrates or reports on aspects of quality assurance. The next section helps to further disentangle this.

4.2. The researcher's role

Several scholars have already commented, as discussed above, that in contemporary scientific research there is a shift in the aspirations the researcher has as he/she chooses to take a different role vis-á-vis the researched (Funtowicz and Ravetz, 1993, 1999; Söderbaum, 1999, 2011*).* From an impartial and value free observer the researcher moves into the role of a learning agent engaged in a reflexive inquiry, or that of an activist committed to issue-driven research.

Of 54 selected publications, 3 indicate that researchers have acted as neutral outsiders, while 17 do not provide sufficient information about this aspect. On the other hand, 24 publications indicate that the researchers became involved with the phenomena under investigation and, for instance, took part in workshops where they contributed to influence group dynamics either by facilitating the process, or becoming a participant observer (e.g., Blackstock et al., 2009; Garmendia and Stagl, 2010; Webler et al., 1995). Researches also report becoming involved with study participants in other ways. For example, 2 publications indicate that researchers acted as activists and undertook research activities in order to achieve (pre-identified) desirable outcomes, while 8 publications suggested that researchers were involved themselves in learning and in reflection which had important implications for the research process (e.g. data analysis and interpretation) as well as for the researcher himself/herself (e.g. worldviews). For example Toderi et al., (2009, p. 554) give an account of how, in reaction to some event, the research team chose to rethink its role: "the agronomists abandoned the expectation that the deployment of scientific data would instigate linear and causative change, in favour of a willingness to explore social learning processes, joint reflection, and the facilitation of the self-organisation of change among multiple stakeholders". Not only did team members become committed to facilitate change, but they themselves become part of a learning process and, as a result of interaction with other stakeholders, experienced a change in their own frames of reference. "The process increasingly became a stakeholder-driven process and as such had the (unexpected) result of re-shaping the ongoing research activities of the research team. The team's development as reflective practitioners was fundamental to the identification of new factors influencing the system of interest, and to the identification of new boundaries to what needed to be included in the system in order to improve the management of water quality" (Toderi et al., 2009, p. 561). A similar experience is mentioned by Millar and Curtis (1999) and Schneider et al. (2009). However, rather than focusing on reflexivity and considering how it influenced the worldviews of those involved, in these studies the focus is on knowledge co-production between scientists and other stakeholder groups e.g. farmers, experts. Coding of this item was quite a challenging task as information about how researcher(s) positioned vis-á-vis the researched is not always included and in several cases this was extracted from sentences meant to clarify other things that we regarded were useful to this end as well.

As already mentioned above, certain research approaches (e.g., interpretative and post normal) favour the involvement of stakeholders and other social actors in the research process as it assumed they bring in new repertories of interpretation and in so doing contribute to a more rounded understanding of the phenomena under observation. However, only 6 publications out of 54 indicate that stakeholders were involved in problem definition. Also, only 12 publications indicate that data collection and analysis was undertaken with a degree of stakeholders' involvement. Given that there are no general guidelines on how to report on this aspect it could be assumed that some might have chosen not to write about this and thus a suggestion for future research is to be more explicit when reporting on methodological aspects. On the other hand, if we assume that papers have indeed reported accurately upon the research done then, from a post-normal perspective, the above numbers could indicate that stakeholders are being given limited space for participation. This comes as a surprise, since the expectation for a research

agenda that prefers depth over breath and favours a variety of repertories of interpretation is not only to be reflexive but also open. Perhaps an explanation for what seems to be low involvement of stakeholders in problem definition, data collection and analysis, could be ascribed to institutional barriers that researchers encounter within their own departments, the funding bodies supporting the research, and the kind of publishing opportunities they are expected to pursue. Stakeholders themselves might not have the time, the political support or the interest to contribute to the research process. Another explanation might be that since social learning is an emerging research theme, problem definition very often remains within the domain of researchers, especially where the core goal of a study is to increase understanding of social learning, which was the case in roughly 50 % of our sample.

This analysis exposes a tension. On the one hand, on the basis of the methodological choices being made by researchers, we find that the social learning discourse seems to be leaning toward the critical and interpretivist approaches, while on the other hand there seem to be expectations about testable knowledge. The tendency of researchers not to disclose the methodological choices that they have made makes it difficult to tease this trend out (Dillon and Wals, 2006). However, we suspect that Kuhn's (1973) observations about the role that paradigms have on how we engage and understand scientific research might help us to locate this tension. Kuhn (1973, p. 46) pointed out that: "Scientists work from models acquired through education and through subsequent exposure to the literature often without quite knowing or needing to know what characteristics have given these models the status of community paradigms". The assumption that the nature of observation may be influenced by prior beliefs and experiences of the scientist challenges the position that scientists are neutral observers. This review has focused on a specific applicative domain i.e. natural resource management. Although this field rapidly becoming interdisciplinary, we can assume that a majority of this community is constituted of scientists with training in the natural sciences where a positivist approach to scientific research dominates. This training would influence expectations and the way scientists are engaged in borrowing practices from the social sciences and humanities. If this is the case, then what we are seeing might well be the outcome of interdisciplinary cross-fertilisation that is in the early stages of evolving its own methodological agenda. Although beyond the scope of this study, an analysis of the disciplinary backgrounds of researchers would offer further opportunities for the interpretation of the above results.

Therefore, rather than the alignment with a particular research approach our findings seem to indicate that social learning research is moving between the interpretative, the critical and, to a lesser extent, the post-normal, and is using methodologies and modes of inquiry from all of these.

5. Conclusions

The present analysis focused on empirical research on social learning with the aim to reflect on aspects that pertain to the process of knowledge production and validation. This study found that social learning researchers are moving between more than one research approach, namely the interpretative, the critical and the post-normal, and are using methodologies and modes of inquiry from all of these. In natural resource management, much like in ecological economics and other cross-boundary areas, researchers come from a wide spectrum of disciplines. They bring with them expertise, long years of specialised training and consequently expectations about knowledge production and validation which might not always be shared among others working in the domain of interest. This could partially explain why criticism has been growing of the ways in which social learning is approached (e.g. Muro and Jeffrey, 2008; Reed et al., 2010). However, being more explicit about the methodological choices that are made should help to assuage these criticisms in the future.

Annex I. Data extraction form: general trends

Analytical item	Codes
Natural resource	Agriculture and rural development Biodiversity and wildlife Forest Land use Water Other
Geographical location[1]	Africa Asia Europe Latin America North America Oceania More Other
Application	Monitoring and evaluation Planning (inclusive of games and environmental assessment) Resource management
Type of research	Empirical Conceptual
Direct or indirect assumptions about the nature of SL	Emergent Facilitated

Annex II. Data extraction form: Interdisciplinary influences

Citations to established scholars*	Dryzek Habermas Argyris Bandura Freire Kolb Mezirow Capra Checkland Forrester Folke Holling Maturana

* This code-book accounts only for the first author as the objective was not to get an exhaustive list of "citations to individual authors", but rather map out "which boundaries" have been crossed. In the case of a multi-authored publication *e.g.,* Argyris and Schön, we recorded only the first author *e.g.,* Argyris.

Annex III. Data extraction form: methodological choices

Analytical item	Coding
Study design	not applicable = 0 case study = 1 multiple-case study = 2 experiment = 3 longitudinal = 4 reports/analyses of completed research = 5
Data collection method	not applicable = 0 interviews unstructured = 1 interviews semi-structured = 2 observation direct = 3 observation unobtrusive = 4 text selection = 5 questionnaire = 6 not revealed= 7
Sample selection	not applicable = 0 not revealed = 1 random sampling = 2 non-random sampling = 3
Subjects involved in research problem definition	not applicable = 0 researcher alone = 1 researcher + community =2 researcher + policy-makers= 3 researcher + community + policy-makers = 4
Subjects involved in data collection.	not applicable = 0 researcher alone = 1 community = 2 researcher with community = 3
Researcher's role	not revealed = 0 neutral outsider = 1 participant = 2 learning agent = 3 activist = 4

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