COmmunity-based Management of
EnviromenTal challenges in Latin America

D3.1: "Locally-adapted Scenario Building Evaluation of Methods"

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Executive summary

COMET-LA is an action research project that explores if and how specific methods may support sustainable community-based governance in the face of climate change and other challenges. This deliverable (1.3) reports and evaluates the methodological learning arising from attempts to implement scenario-planning, during the third and final year of the project.

In this evaluation of experiences of scenario-planning, we focus on identifying insights as to whether the methodology trialled may be of use for strengthening CBNRM. This is needed as many existing attempts to implement CBNRM have been associated with frustrations and disappointments. Key problems include a lack of adaptiveness to future change, a lack of systems thinking, and a need for more genuine participation and empowerment of communities. Scenario-planning is an approach associated with benefits that may be relevant to tackling these problems, but these claims are unproven and require testing. The potential relevance of scenario-planning to CBNRM is fully elaborated in section 2.

Section 3 describes the scenario-planning method used by COMET-LA. Scenario-planning is not a single technique, but rather a wide family of approaches that emphasise the need to consider future change. Therefore, for COMET-LA a four-stage methodology was created, in order to build on the latest insights of the scenario-planning literature, be suitable for use for communities, and connect with previous work carried out by the project. The implementation of the methodology was carried out in March – July 2014.

Section 4 presents and evaluates the experiences of implementing the methodology. This section first discusses the feasibility of the method, explores what benefits were generated by the methodology and hence whether it was felt to be worthwhile to use. Finally, it focuses on whether the benefits are relevant to strengthening CBNRM.

Overall, all stages of the methodology were found to be feasible to implement. Although it often took effort to plan and carry out, most parts of the methodology were judged worthwhile to implement. When the reasons for these judgements are explored, we see a variety of benefits were linked with different stages of the process, many of which correspond with those expected to strengthen CBNRM. In particular, it seems to have promoted systems thinking, more consideration of future change, and helped strengthen participation and/or use of local knowledge.

The benefits to systems thinking seem to be specifically associated with the methodology's emphasis on taking a systematic approach: in particular through methodically considering effect of drivers on variables (called 'morphological analysis') in stage 1, whose resulting matrix that was used in the next stage to help create scenarios (coherent descriptions of possible futures). Morphological analysis is particularly onerous and requires care to facilitate, but the results seem worth this effort.

Experiences with the methodology also emphasised the need to reserve equal effort, in stages 3 and 4 for using these scenarios as a spur to consider and evaluate possible 'response options' i.e. measures that could be taken to promote future community resilience. This step was also found to be particularly useful for helping communities to identify connections between issues i.e. further promoting systems thinking, as well as really focusing on the practical implications of change for their socio-ecological system, and the multiple actors that needed to be involved.

The benefits to local empowerment were particularly obvious in the case of Argentina, where there was no history of community-based management or organisation. Although some these benefits may well have arisen from any well-facilitated process, not necessarily scenario-planning, an emphasis on thinking about the future seemed to help identify and differentiate responsibilities. In all cases the methodology seems to have helped support social learning, since community ideas evolved without any external knowledge being introduced. However, it is an open question as to whether it would have been preferable to have more explicit opportunities to learn from or incorporate scientific knowledge. The results of process that is community-led and also based mainly in local knowledge may have little credibility with external actors.

These insights are synthesised and discussed in section 5. This section finishes by identifying implications for future research. For example, there is a need for further work to explore how best to structure the identification of robust response options and the exploration of their implications for adaptive governance and CBNRM: the literature provides few other examples of how to do this. In general, there is a need for future work on scenario-planning to better emphasise and evaluate the use of scenarios, rather than seeing scenarios themselves as end-products. There is also a need for more approaches to evaluate scenario-planning that can explore the views and actions of community members themselves, before during and after implementation.

Therefore, this report concludes in section 6 that scenario-planning can be useful for CBNRM, and that the COMET-LA methodology, with adaptations, can be useful for those seeking to support CBNRM in other situations. However, further research will be required in order to fully understand and realise the full potential of scenario-planning for CBNRM.

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List of abbreviations and glossary

CBNRM	Community-Based Natural Resource Management
COMET-LA	COmmunity-based Management of EnviromenTal challenges in Latin America
CSOs	Civil Society Organizations
DoW	Description of Work
Driver	A key external force acting with a significant influence on systems and management outcomes. Examples include climate change and economic globalisation.
MICMAC	*Matrice d'Impacts Croisés Multiplication Appliqués à un Classement*, or Crossed Impact Matrix Multiplication Applied to a Ranking
PCA	Principal Component Analysis
PSA	Prospective Structural Analysis
Scenario	A coherent internally consistent and plausible description of a possible future state (including both social and natural aspects)
Storyline	A storyline is similar to a scenario: it focuses on explaining how a scenario came into being.
SES	Social-Ecological System
STEEP	Societal, Technology, Economic, Environment, Policy – a prompt for different types of possible drivers to consider during scenario-planning.

1 Introduction

COMET-LA is an action research project that explores if and how specific methods may support sustainable community-based governance in the face of climate change and other challenges. To achieve this aim, COMET-LA trials and evaluates the application of specific methods in three cases, socio-ecological systems in Mexico, Colombia and Argentina. These methods have been designed to help communities to (i) characterise their local systems, (ii) identify key variables and influential relationships between these variables, and finally (iii) consider how future change may act on their system. Taken together, it is hoped these methods will help communities adapt and respond to change.

This deliverable (1.3) focuses on the last stage of COMET-LA's work: it reports the methodological learning arising from attempts to consider the effects of future change, during the third and final year of the project. The methodological learning that has arisen from the previous steps of the project is reported in two preceding deliverables (Delgado Serrano et al., 2013; Delgado Serrano et al., 2014).

What do we mean by *methodological learning*? This entails synthesising the experiences of the last year of COMET-LA, in order to identify new knowledge and insights about how the methods trialled may be of use for CBNRM. This type of learning is needed because although CBNRM is a popular concept (Western et al., 1994), attempts to implement CBNRM have often been associated with frustrations and disappointments (Dressler et al., 2010). Furthermore, it is not well understood how to encourage community consideration of climate change and other future pressures on systems. Whilst COMET-LA has selected certain methods because they are thought to be useful, exactly if and how certain methods or techniques support CBNRM is poorly understood. Thus, it is essential to trial new methods and approaches, and to describe and reflect on these experiences, so as to inform and improve CBNRM in the face of future changes (Shackleton et al., 2010).

Thus, this deliverable describes why and how certain scenario-planning techniques were selected for use in COMET-LA, and it then reflects on experiences of using these methods to ask if and how they may be useful for CBNRM in other situations.

This deliverable does not describe the detail of the process and outputs of the methodology applied in each case: this is already described elsewhere. For each case (figures 1-3), there is a report which contains a complete description of the exact locally-adapted process and outputs generated (Escalante Semerena et al., 2014; Farah et al., 2014; Rojas et al., 2014). These reports were written by local project partners, a mixture of Civil Society Organisations (CSOs) and academics, that have lead implementation of the project in each country. Furthermore, there is a separate report which summarises and compares these experiences and outputs, highlighting interesting differences and similarities between the different systems (Martin Ortega et al., 2014). Readers may find it useful to cross-reference these other reports.

This document begins by summarising why scenario-planning methods are expected to be relevant and useful for CBNRM (section 2), and then builds on this to explain how a scenario-planning methodology was designed, implemented and evaluated for COMET-LA (section 3). Section 4 then explores if implementing this methodology was judged as worthwhile by COMET-LA partners, and explores the nature of the benefits generated by this process. Section 5 summarises these experiences to highlight key implications for the use of scenario-planning in other situations, and key challenges for future research and practice on this subject.

Figure 1. Experiences of scenario-planning in the Colombian case, where water and biodiversity management are key issues, are detailed in D2.3

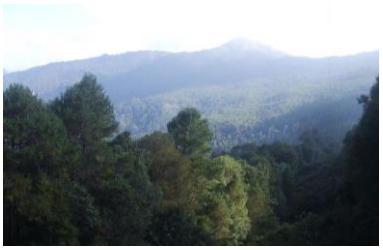


Figure 2. Experiences of scenario-planning in the Mexican case, where forest management is a focal issue, are detailed in D3.3

Figure 3. Experiences of scenario-planning in the Argentinan case, where marine and coastal management is the focus, are detailed in D4.3

All COMET-LA deliverables are available from:
http://www.comet-la.eu/index.php/en/publications

2 Background: why connect scenario-planning and CBNRM?

This section introduces the concept of Community-Based Natural Resource Management (CBNRM), what scenario-planning means, and why it may be relevant to CBNRM.

2.1 CBNRM

CBNRM is a hugely popular and influential approach to improving the practice of natural resource management and conservation (Western et al., 1994).

Prior to the 1980s, most approaches to natural resource management had relied on an overly top-down technocratic model of conservation and preservation, that often excluded or limited local people (Adams, 2009). This exclusionary approach gradually came to be seen as untenable. Examples accumulated that suggested the exclusion of local people was ethically problematic (particularly in developing countries), economically costly, and often failed to achieve the original conservation goals.

As a response, the management and care of nature began to be seen as something in which people should be involved, and for this reason the notion of 'participation' of some kind is now very common to many documents and policies on nature and conservation (Reed, 2008).

This emphasis on participation and empowerment underlies and inspires the CBNRM concept. CBNRM projects take many diverse forms, but the common rationale is that local people can and should be involved and empowered in the management of their natural resources: when they do, this is likely to result in most socially beneficial and equitable outcomes. Early enthusiasm for CBNRM was fostered by the apparent success of famous projects such as 'CAMPFIRE' in Zimbabwe (Matzke & Nabane, 1996). CBNRM projects can now be found in developing countries across the world, often promulgated by NGOs and aid agencies.

However, despite the popularity of CBNRM, the concept is being challenged. Some projects have reported mixed or poor outcomes (Brooks et al., 2012) and some of the projects that once seemed so successful, such as CAMPFIRE, have since reported problems (Balint & Mashinya, 2006). For example, some projects have been criticised for not fully involving or empowering all members of a community (Méndez-López et al., 2014), others have struggled to achieve their aims due to external pressures or drivers (e.g. Scholte, 2003), whilst some have had negative social and/or ecological impacts due to unintended side effects (e.g. Haller et al., 2008).

These disappointments may relate to a few common underlying problems. First is a tendency for project design and implementation to be static and inflexible (Armitage, 2005). Secondly, many project plans are thought to over-simplify and not fully take into account project context, particularly the influences on and motivations of local actors (Saunders, 2014). Furthermore, any problems with considering complexity, adopting socio-ecological systems perspectives, or fully involving community members may even reinforce each other. For example, if only scientific data is relied upon instead of local knowledge, and scientific data is only available on a few issues, this can also hinder systems thinking. Such challenges are

redolent of 'wicked problems': problems that are intractable, complex, and contested (Ludwig, 2001).

Thus it is clear that the practice of CBNRM needs improvement (Dressler et al., 2010): not doing so jeopardises both biodiversity and the well-being of those people whose lives and livelihoods depend on it. Even though there will be no easy solutions, some key needs are apparent: to (1) adopt a systems perspectives and understanding, particularly focusing on how ecological and social systems are linked; (2) emphasise and foster iterative social learning; and (3) develop adaptive capacity – the ability to consider and respond to change. These needs are a summary of those identified by the literature on CBNRM (e.g. Shackleton et al., 2010) but also resonate with the recommendations about how to tackle wicked problems (Game et al., 2014).

Although there is agreement on what types of changes are needed to improve CBNRM, it is rather less clear what methods or techniques could achieve these changes, and when and how they may do so (Shackleton et al., 2010). Authors have suggested a handful of methods or techniques (e.g. Lynam et al., 2007) and amongst these the idea of 'scenario-planning' is receiving increasing attention (e.g. Pert et al., 2010; Schreckenberg et al., 2010). It is thought that scenario-planning may help to foster creativity, dialogue as well as explicit consideration of change and complexity and the requirements for adaptation (Game et al., 2014; Wright & Goodwin, 2009). These putative benefits match many of the needs identified for CBNRM, so it is particularly useful to focus on this approach, to understand if and how it may strengthen CBNRM (Peterson et al., 2003).

2.2 Scenario-planning

Scenario-planning (sometimes seen as synonymous with 'futures thinking') has long been seen as useful means to facilitate the identification of complex and emerging problems, together with the development of strategies by which these challenges may be tackled (Kahane & van der Heijden, 2012). Its origins lie in military and business settings (Bradfield et al., 2005). Certain famous examples – such as the successful business strategy developed by the Shell oil company in the 1970s – have fostered its spreading popularity.

Scenario-planning usually entails using a few contrasting 'scenarios' – i.e. coherent descriptions of future states – in order to explore the uncertainty surrounding the future consequences of a decision. These scenarios are not predictions because the future is inherently uncertain, but they should be seen as plausible and coherent– i.e. consistent with the known laws of causality– (Mietzner & Reger, 2004).

Scenario-planning is not a single well defined method. A wide variety of methods and means can be used to develop scenarios. Although the '2-axis method'[1] has become a particularly well-known means to construct scenarios, since it was popularized by the Intergovernmental

[1] The '2 axes' method develops four scenarios from a grid whose two axes are defined by the 'most important' and the 'most uncertain' drivers of change facing an organization or topic. A concise description is contained within (Bezold, 2010).

Panel on Climate Change (IPCC, 2000), there are many other options. What all methods do share is an emphasis on considering 'drivers' of change, forces that can strongly affect the system or problems in question (van der Heijden & ten Heuvelhof, 2012). The best known driver of future change is climate change but drivers can come from a variety of other environmental and societal sources, i.e. a change in land-tenure policy. As decision-makers to deliberate and share knowledge on potential drivers and their effects, it is hoped they can help make plans that are more 'robust' to future change.

Looking beyond drivers, the family of scenario methods becomes very diverse. Different methods may or may not employ specific software tools, or involve formal consideration of past trends. Similarly, methods vary in the timescales, spatial scales, the sources of data and types of knowledge used, and how many stakeholders can be involved, and how they are engaged. This makes it very hard to describe or generalise what a 'typical' scenario-planning process entails. Despite this, several authors have tried to classify this diversity (see for examples the typologies and tables of Börjeson et al., 2006; Mietzner & Reger, 2004; Rounsevell & Metzger, 2010; van Notten et al., 2003). These classifications vary, but taken together they highlight some important distinctions between different scenario methods, and highlight choices that must be made by anyone seeking to develop a scenario-planning process. Many methods could be grouped according to different schools of thought that arise from different countries or cultures – see Box 1. However it is equally true that some methods

Box 1. Different origins and cultures of scenario-planning.

There are a diverse set of methods designed to help consideration of the future, and this partly reflects the diverse origins and rationales for futures thinking and scenario-planning. It is beyond the scope of this report to fully trace the genealogy of present scenario methods, but we here briefly review the key schools of thought that have given rise the present diversity of methods.

Some of the earliest enthusiasm for the idea of scenario-planning came from the military, during and after the second World War (Daum, 2001 in Mietzner & Reger, 2004). In the 1960s this approach to scenario planning was refined by Herman Kahn. It was seen to be useful for helping to interconnect complex elements to create a coherent and plausible story of relevance to strategic planning. A related 'probabilistic' school of thought developed techniques for modelling and using quantitative approaches. In the 1970s, this 'intuitive-logic' approach was further popularized after the success of the Royal Dutch/Shell company in using scenarios to inform their planning work.

Proponents of the intuitive-logic school argue that scenario-planning will be useful not because it accurately forecasts the future, but because it helps participants change their view of current reality and potential range of futures. However, an alternative school of thought, with its origins in French Philosophy, has argued that both the probabilistic and intuitive-logic schools are still too rooted in forecasting (Godet, 1982), and more attention needed to be given to normative goals and visions, in combination with a rigorous approach to understanding systems. This school, called 'La prospective' has been particularly popularized by Michel Godet, who has developed several techniques and methods together are called Prospective Structural Analysis (Godet et al., 1994). (Rounsevell & Metzger, 2010) has suggested that the "narrow scope" of prospective methods, which are typically applied to business and policy settings, may make them less suitable for tackling many environmental issues, although it is certainly important to consider normative issues in planning.

To read more about the genealogy of scenario-planning see (Bradfield et al., 2005; Mietzner & Reger, 2005) and references therein. For more information and sources of reading about 'la prospective' method as conceptualized and developed by Godet, see box 2.

are associated with different schools of thought but are actually quite similar in practice. Therefore, here we focus on two important distinctions, influenced by the typology of 'overarching themes' identified by van Notten et al. (2003).

Firstly, there is an important distinction between methods that follow an 'exploratory' approach, i.e. focus on exploring what *could* happen, versus those that focus on a 'normative' approach, i.e. focus on exploring what is *desired* to happen (Godet & Roubelat, 1996; Kok et al., 2011). Normative methods are particularly useful in situations where there is a clearly defined target and the goal is to identify how this can be achieved. Exploratory approaches are perhaps more useful where the goal is more to consider how to adapt to different aspects of change (Börjeson et al., 2006).

Secondly, there is a key distinction between methods that can use and/or generate quantitative data, and those that do not (van Notten et al., 2003). One advantage of scenario-methods is that they are thought to promote the use and integration of different forms of knowledge (Kok et al., 2007), including local knowledge; however, methods vary greatly in the forms of knowledge they can accommodate (and may privilege). At one extreme are methods that rely on the use of quantitative datasets and/or enforce the quantification of pre-existing understanding: these methods also often use modelling to produce quantitative outputs as part of the scenario outputs. They can be seen as relatively deterministic. By contrast, other methods lean heavily on qualitative knowledge from stakeholder and/or expert judgement: these methods tend to produce qualitative narrative scenarios as the outputs and are not constrained by limitations in modelling ability or inputs.

Quantitative methods are associated with a desire to ensure rigorous use of existing data and/or where numeric models or projections are seen as necessary to inform or convince decision-makers, whereas qualitative methods are favoured by processes that wish to encourage creativity and open-minded thinking (e.g. van Notten et al., 2003). Quantitative approaches may be associated with scenarios that encompass fewer issues – influenced by whatever issues can be modelled – but these models potentially have high credibility with external audiences. By contrast, qualitative methods can produce scenarios that are complex and describe interconnections between a wide variety of issues. Furthermore, they more likely to be participatory rather than expert-led (Rounsevell & Metzger, 2010).

These two themes: exploratory versus normative, and qualitative versus quantitative are a useful way to highlight key choices to be made by anyone intending to use scenario-planning.

Of course, many methods cannot be classified in one category (e.g. exploratory not normative) – there are many examples where elements of both approaches have deliberately been mixed (e.g. Palacios-Agundez, 2013). This report does not go further in describing the methodological options available to a scenario-planner, since this alone would fill a book. However, many of the diverse techniques and approaches are described or linked to by references in this article (for example see Bradfield et al., 2005; De Jouvenel, 2000; Kok et al., 2007; Kosow & Gaßner, 2008; van Notten et al., 2003).

2.3 Scenario-planning and CBNRM

Several authors have already suggested that scenario-planning could also help tackle the challenges of managing complex socio-ecological systems. Scenario-planning may be particularly helpful for tackling environmental challenges associated with a high degree of uncertainty (Peterson et al., 2003): this is the situation for most CBNRM projects, which seek to intervene in complex socio-ecological systems that are typically poorly understood.

A more recent review of the potential benefits of scenario-planning for environmental management (Bengston et al., 2012) also reiterated its value for dealing with complexity and uncertainty. Scenario-planning is thought able to highlight unintended consequences of trends and proposals, and explore the effects of potential surprises (also called 'shocks'). Bengston also emphasised that scenario-planning can promote the inclusion of a variety of stakeholder perspectives; and encourage creativity and idea-generation. This suggests that scenario-planning might also be able to help tackle the challenges of knowledge sharing and collaboration inherent to CBNRM. Peterson (2003) argued that if scenario-planning prompted systematic consideration of diverse information, by a diverse group of stakeholders, better 'shared understanding' and decisions would be reached. This type of social learning process (Keen et al., 2005) could not only improve understanding of the systems to be managed, but also help promote desired local participation and empowerment.

If scenario-planning can indeed deliver all these benefits, the value of any method chosen is likely to depend as much on its process (i.e. processes of deliberation) as the eventual outputs (i.e. the scenarios themselves). This has implications for the selection of scenario-planning methods that may suit CBNRM, in that any specific method should prompt explicit discussion of uncertainty and/or shocks, and will also allow and encourage the participation of community members' knowledge and ideas for management. Revisiting the distinctions described in the previous subsection, some choices become clear: (1) exploratory methods will support anticipatory adaptation and choice of 'robust' strategies, especially where there are contested or poorly-defined goals and problems; (2) methods must be able to incorporate and equally value knowledge from local stakeholders, rather than just privileging those with quantitative data or models; and (3) scenarios must be complex in order to reflect the complex reality of socio-ecological systems (yet not so complex that they deter community engagement).

There are already some examples of initiatives that have successful used scenario-planning to support environmental management. Amongst the most relevant examples is the experience of Enfors et al. (2008) who found scenario-planning useful for supporting participatory decision-making on water management in Tanzania. This initiative used an exploratory qualitative method that generated 4 different scenarios: this was reported to assist in developing systems thinking and perceptions of connections between issues, as well as helping explore local hopes, fears and uncertainties. However, there was a potential problem in that using locally-derived drivers could unduly ignore important external forces, and hence limit the scope of the ideas and actions considered. Wollenberg et al. (2000) described how a scenario-planning process in Madagascar produced benefits both in terms of adaptiveness (ability to both anticipate and respond to change) but also in terms of fostering collaboration.

Other authors have reported some similar or related benefits from the use of participatory scenario methods in developed-country settings. For example, Hill et al. (2010) reported it helped empower individual and institutions, promote the systematic use of evidence, and galvanise new actions. Some have taken a participatory approach that combines an exploratory and a normative approach and/or aims to engage higher-level stakeholders such as national-level policy-makers, not just local communities (e.g. Palacios-Agundez, 2013) but most of these processes have used exploratory approaches to generate the scenarios, (e.g. Pert, 2010).

There are a few examples of experiences in developing scenarios for environmental management in developing country settings that have used approaches heavily dominated by technology or data-sets: for example the Agent-Based Modelling and GIS reported for a project in Vietnam by Castella et al. (2005). Projects which involve quantitative modelling can also be participatory and incorporate local knowledge (e.g. Kassa et al., 2009). However, this can risk diverting resources away from participation and towards modelling, and may risk focusing the process only on the issues which data allow to be modelled. Furthermore, the resources and data required for such approaches may be highly atypical for many CBNRM projects.

Therefore, exploratory and qualitative approaches, typically generating about 3-5 contrasting scenarios, seem most likely to be able to produce some of the hoped-for benefits that can help improve CBNRM. In all cases quality facilitation is essential, especially if the benefits of collaboration and local knowledge use are to be achieved (Hill et al., 2010). Good facilitation that encourages local participation and empowerment requires skilled facilitators, and sufficient time (Reed, 2008). However, these considerations by themselves do automatically entail what specific technique should be used: even focusing on exploratory and qualitative methods still encompasses a wide diversity of specific techniques (Rounsevell & Metzger, 2010).

Moreover, evidence of exactly why or specific features of scenario-planning methods might generate benefits is often absent. This evidence is needed for several reasons. Firstly, many of the existing studies on scenario-planning describe how the scenarios were created, but do not say much about of and how these scenarios were subsequently used. Secondly, no-one has attempted to use the same method in more than location. Lastly, formal monitoring and evaluation of these methods is often absent.

Existing evidence provides clear support for using scenario-planning, and suggests qualitative exploratory approaches can be helpful, but also demonstrates a need for more evidence to understand the detail of when and how scenario-planning techniques can strengthen CBNRM. This report addresses this challenge.

3 The scenario-planning methodology designed for COMET-LA

This section describes the specific scenario-planning methodology employed in COMET-LA: it first explains how it was designed, then summarises the methodology and its rationale, then explains how it was implemented and evaluated.

3.1 How the method was designed

As noted in section 2, scenario-planning encompasses a wide variety of approaches and techniques. COMET-LA did not *a priori* assume that any particular technique was preferable, nor that the example from any other setting could be transferred to COMET-LA without modification. Instead, the final choice of techniques that comprise the methodology was specifically tailored to reflect the project's needs and goals.

To choose the method, two types of criteria were applied:

(1) It should be relevant to each case
   a. It should connect with previous work of the project
   b. It must be practically feasible to implement.
(2) It should likely to produce benefits likely to strengthen CBNRM
   a. It should promote adaptation via consideration of future change
   b. It should be suitable for encouraging participation and shared learning
   c. It should help support systems thinking

A wide body of literature was reviewed to search for scenario techniques and choices that would likely address the challenges facing CBNRM, whilst also reflecting best or latest practice in the scenario-planning literature. This literature was summarized in section 2. This review shows that qualitative exploratory approaches are often used, although this still leaves open the choice of a specific technique (Rounsevell & Metzger, 2010).

The selection of techniques for COMET-LA was also informed by the previous activities and outputs produced by the project. The project had first involved each community describing their local situation in terms of socio-ecological systems. This description was structured by the work of Ostrom (2009) and resulted in lists of over 130 system variables, from both the natural, social and governance subsystems (Avendaño et al., 2013; Escalante Semerena et al., 2013; London et al., 2013). The influence of a selected set of these variables on each other had then been explored using Godet's method of Structural Analysis (Godet et al., 1994). See Box 2 (page 10) for an explanation of this and other methods by Godet.

It was important that the scenario-planning method be able to maintain and develop the systems understanding, and be able to somehow use the key variables and their relationships identified within each system. Godet advocates the use of several techniques and methods (which together are called Prospective Structural Analysis). These techniques include steps for looking into the future for scenario-planning: see Box 2 (page 10). Since the earlier steps

Box 2. Structural analysis and other methods advocated by Godet.

Michel Godet advocates the use of several techniques and methods which together are called Prospective Structural Analysis. Godet's methods have been designed to support innovation and decision-making in the face of uncertainty, particularly for business and political leaders.

One of these techniques, called "Structural Analysis", and had been used in each CS prior in earlier work by COMET-LA. Structural Analysis entails recording relationships of influence or dependence between the main variables in a system, as perceived by the stakeholders, and classified them according to the strength of the relationship. These relationships are captured in a software tool called MICMAC, and this tool then allows the relationships to be presented in a variety of ways, and also allows exploration of indirect relationships (e.g. if X affects Y, and Y affects Z, X will also have a strong if indirect influence on Z). By exploring direct and indirect relationships, a few variables (or issues) can be seen as key influencers, changes in which will strongly affect the result of the system.

Subsequent to Structural Analysis, Godet provides other tools and techniques which are designed to promote a systematic consideration of the future.

Firstly, Godet suggests that the use of MICMAC should be followed by an analysis of actors' strategies, structured in a tool called MACTOR, to create a matrix of actors' influences on each other. Next, Godet captures experts' assumptions about the future by asking questions about the probability of different hypotheses, which is captured and presented using a tool called 'SMIC'. Finally, Godet carries out 'Morphological Analysis' in which the effect of key future changes on system variables is considered and presented in a matrix. The last tool provided by Godet is Multipol', which is designed to enable multi-criteria analysis in order to support decisions to choose between 'strategic options'.

To read more about Godet's methods and philosophy see Godet (2006) and to read about the implementation of MICMAC in COMET-LA see Delgado Serrano et al. (2014).

of the project had followed Godet's philosophy and structured analysis using Godet's methods, it was logical to attempt to use aspects of his scenario-planning method, if possible.

Godet's methods have been designed for and very often trialled in business settings. Although they support systematic consideration of issues (frequently structured through the use of matrices) it means that Godet's approach is not oriented to the challenges of community participation and the priorities of CBNRM: this is particularly apparent in the reliance on expert judgment entailed by his proposed SMIC tool. It also means there is no concern with the practical limits of resource, motivation and attention constraints that often limit community engagement with outsiders, as was the case with the partners in this project. The repeated filling in of large matrices can be onerous, and also technically challenging or prohibitive if software must be used.

Therefore, we selected and adapted from Godet's methods with care, by considering what would be likely be practically feasible in all 3 systems. The issue of practical feasibility entailed three main considerations. Firstly, the method should not depend strongly on access to specific software or technology, since some settings might be vulnerable to lack of power or lack access to computers or other infrastructure. This requirement screened out any methods that relied on a particular piece of software, and any method that depended on quantitative modelling. The second requirement was for a method that could be facilitated by teams who had a few months to develop and plan the work, but probably had more limited opportunities

to spend time working with the communities (i.e. in a handful of workshops). This imposed limitations on the extent of work that could be carried out with the communities. The third requirement was somewhat less tangible, but was to find a technique that would be intelligible to partners and communities with no prior interest in scenario-planning: communities would be unlikely to participate in an abstract and poorly justified procedure with no apparent relevance to their current problems and plans.

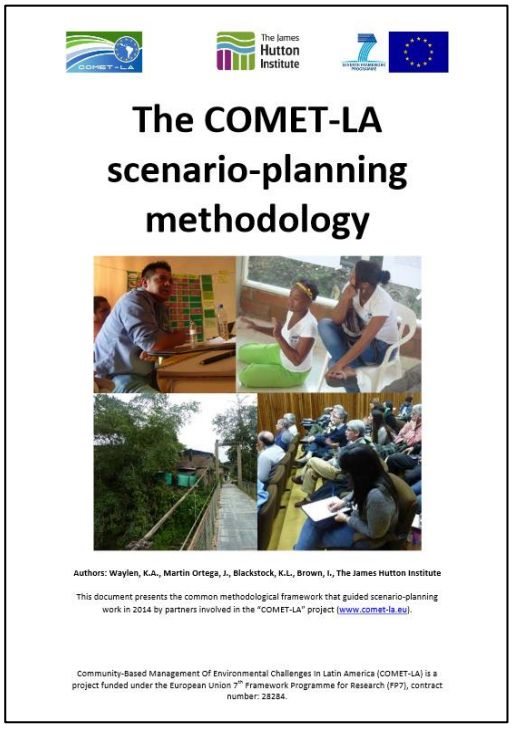
Taken together, these considerations suggested that Godet's steps involving SMIC and MACTOR were unsuitable as they relied on expert rather than community knowledge, and demanded the use of software. Furthermore, if carried out with the other previous and later steps they would mean that the communities would be asked to fill in four different types of large matrices. However, we identified Godet's 'Morphological Analysis' (described in the next section) as being the key step, since this would prompt systematic consideration of drivers on variables. We discarded the later steps of multi-criteria decision-making as being suitable for single issue decision-making, with clearly defined choices - as is the case for some aspects of business strategy- but not at all suitable for community deliberation over the management of complex socio-ecological systems. However, we accepted the need to actually use the scenarios to inform local planning and/or decision-making, and so scoured the scenarios literature to find alternative ways of facilitating this.

3.2 Summary of the final methodology and its rationale

The methodology was drafted in December 2013, and after feedback from partners in the 2013 methodological meeting, it was agreed upon by all partners and finalized in February 2014.

A standalone document "The COMET-LA scenario planning methodology" provides the full detail and explanation of the final methodology (Waylen et al., 2014). This section provides an overview of the activities within the methodology, focusing on the rationale and expectations for each step. An overview of the techniques and their rationale is provided in Table 1 (page 13).

Figure 4. The detail of the COMET-LA scenario-planning methodology is available as a 23-page report (Waylen et al 2014).



The methodology begins by asking for 5 drivers of change to be identified, structured by the STEEP typology (see box 1, page 12) and informed by the specific form of drivers used by the regional scenario-planning exercise for Latin America (Millennium Project, 2010). Two potential states should be specified for each driver (i.e. if population growth is a driver, state 1 could be specified population growth and

Box 3. Drivers of change.

Integral to any scenario-planning process is identifying how drivers of change may affect a system. (Indeed, this can be said to distinguish scenario-planning from ordinary forward planning.)

Perhaps the most familiar driver of change is climate change. However, climate change is certainly not the only change we can expect to see in future. Despite the many uncertainties associated with the extent nature and effects of climate change, trends in global and local climates are fairly well understood. Drivers of change can also arise from a variety of environmental and societal issues. For example, a drastic change in land-rights policy can have a significant impact on local land ownerships, uses and livelihoods.

Compared to climate change, which is relatively well studied, many of these other potential drivers are often rather less certain in their direction and effect. It is thus challenging to select drivers of change, but important that climate change does not receive an undue emphasis. A popular way of ensuring a wide range of drivers are considered is to use the 'STEEP' acronym as a prompt, which represents Societal, Technology, Economic, Environment & Policy drivers (Bradfield et al., 2005). It can also be useful to consider the drivers of change developed by other reputable initiatives: for COMET-LA, the drivers of change developed for the Latin American region as part of a large scale Delphi process (Millennium Project, 2010) seemed particularly relevant. This initiative pointed out the importance of changes in internet access, food prices, tourism, biofuels demand, climate change, organized crime, corruption and protectionism.

state 2 could be a static population). The drivers were chosen by the facilitators, informed by this guide, since other experiences suggest that local selection of drivers tend to ignore and underestimate the power of external forces (Enfors et al., 2008; Roe, 2009) and furthermore this can use time and resources that leave less time for discussing implications of scenarios later in the process.

Next, the effect of these drivers on the local system are considered, focusing on key variables of the system as identified by previous work in COMET-LA. The 2 states of each drivers and variables are captured in a matrix (variables down the left, and drivers along the top): the process of deciding how each driver state will affect each variable, and filling this into the relevant matrix call, is called 'morphological analysis'. Morphological analysis potentially entails a great deal of effort to carry out, but allows systemic consideration of variables previously identified by the project, and is consistent with the methodological approach of Godet, whose methods influence earlier stages of work in COMET-LA.

The resulting cells in the 'morphological matrix' represent a large number of potential futures, which could be combined in many ways. This matrix was to be used to create 3-6 narrative scenarios i.e. contrasting descriptions of possible futures. To help guide navigation of the matrix, in order to identify a few scenarios, the COMET-LA methodology recommends the uses of 6 "archetypes" of the future (Hunt et al., 2012). Hunt has argued that these archetypes encapsulate a wide range of potential futures and are relevant to many situations, and so using them as a guide can help to ensure different scenarios are sufficiently distinct, which is important if they are to be useful (Bezold, 2010).

Once 3-6 scenario narratives had been created and validated, the methodology prompted for the identification of 'response options' – actions or initiatives that could be useful to help achieve management goals even in the face of future change. These response options could include actions by the community as well as by other actors, and they could include existing activities and plans as well as completely new items. The use of 7 P's – Policies; Plans (design), Processes; Programs; Procedures; Products; and People (behavior) – (see footnote within Low Choy et al., 2012) was suggested in order to help prompt consideration of a wide range of types of actions, at a range of governance levels. Low Choy's use of these prompts for response options is, as far as we know, unique within scenario-planning. However, we found no other systems of prompts that would help people identify different types of response option, although some focused on the next step, i.e. on understanding how identified-options could be encouraged or incentivized (e.g. Vira et al., 2011).

Table 1. The stages forming the COMET-LA scenario-planning methodology, and their rationale.

	Activity in methodology	Rationale for this activity
Stage 1, Explore how drivers of change may influence the system	¬ Select 5 external drivers of change, guided by the STEEP typology ¬ To consider drivers previously used by the Millennium Project	¬ To prompt consideration of how different types of external issues that could affect the local system. ¬ To use credible drivers already developed by other relevant processes.
	¬ Record how drivers influence the local system: 'morphological analysis' to produce a 'morphological matrix'.	¬ To ensure systematic consideration of how every driver affects every key system variable. ¬ To allow use of system variables described in previous COMET-LA work, and to be consistent with Godet's approach to scenario-planning
Stage 2, Construct alternative future scenarios	¬ Navigate the 'morphological matrix' guided by archetypes. ¬ Create 3-6 narratives ¬ Confirm the narratives	¬ Archetypes provide contrasting visions of the future, so helping ensure a wide range of possibilities are considered and planned for. ¬ Narratives provide coherent explanations and detail of how various drivers and issues interconnect, consistent with but more accessible than a matrix.
Stage 3, Identify response options	¬ Review existing actions and plans ¬ Identify potential response options, guided by 7 Ps.	¬ It is important to identify a full range of possible responses that may include completely new activities. The 7 Ps may help guide this. ¬ Existing plans and activities may also be relevant in future.
	¬ Discuss 'robustness' of response options ¬ Consider shocks	¬ Response options that seem feasible and useful in more than one scenario ('robust') should be prioritised. ¬ Discussing shocks should add an additional opportunity to consider robustness, and the possibility of change.
Stage 4, Discuss implications of response options	¬ Explore the implications of robust options ¬ Identify implications for local plans and governance systems	¬ Moving from planning to implementation requires a detailed understanding of exactly who and what is involved. ¬ Planning and prioritising options should take into account the potential social and environmental effects of implementation.

Once potential response options had been identified, their feasibility and usefulness had to be considered in each future scenario. To do this, response options were systematically assessed

in a matrix of scenarios and the potential responses. Only those options which were useful in more than one scenario were 'robust' and so were be prioritized for later discussion (Ranger et al., 2010). Finally, 1-2 shocks were to be identified by the partners (shocks are abrupt changes to the system, usually large-scale disasters such as financial crashes or tsunamis). Discussing response options in the face of shocks was intended to reinforce consideration of 'robustness'. Therefore, the discussion of robustness was expected to result in a smaller list of response options to be taken forward as priorities for planning.

The last stage of work intended to provoke more detailed information and consideration of each robust response option. The methodology suggests using questions to scope the environmental, social and economic sustainability of each option, including equity considerations. This was informed by several examples in the literature (Brummell & MacGillivray, 2008; Low Choy et al., 2012; Peterson et al., 2003; Willows & Connell, 2003), but did not directly follow any single precedent. The questions aimed to ensure social, economic and environment implications were identified and the specific detail of response options discussed.

Only once the detail and implications for each action were thoroughly understood would it possible to choose which to prioritize, and plan precisely how they would be implemented and who would be involved. Communities were encouraged to consider updating or creating local plans that reflected the options they wished to pursue, but this was not mandated.

The methodology recommended that the community should participate in carrying out or at least validating each step, and suggested 1 workshop per stage to achieve this: however, the exact form of community involvement was decided by each case study partner.

3.3 Implementation and monitoring of the methodology

The method was implemented by the local partners to each case, from March – July 2014. At each site, 3 or more workshops were held with community members in order to ensure community input, buy-in and involvement to the process. Throughout the process, reports on outputs were created by the case partners and shared with the partner responsible for designing and evaluating the method (the authors of this report).

All partners were able to implement every stage of the shared methodology, although with variations and adaptations in each case. These outputs form the basis of deliverables 2.3, 3.3 and 4.3. Differences in the activities and outputs are synthesized and summarized in COMET-LA Deliverable 5.1 (Martin Ortega et al., 2014).

Because the value of scenario-planning methods may arise from the process of dialogue and interaction they entail, it was felt important to collect information on these experiences, as well as the more tangible outputs arising during the process. Therefore, in addition to collecting the outputs resulting from implementing each stage of the methodology, we collected experiences of the methodology by carrying out debriefing interviews. These were convened by skype and held with each case partner separately. These interviews typically occurred after major stakeholder-engagement events of workshops by each partner. In these

interviews, a topic /question guide was used to probe experiences of implementing the method (Annex I). As far as possible the interviews were conducted so as not to prompt or prejudge opinions as to if and how the methodology might prove useful. These interviews were recorded and transcribed. Furthermore, some partners provided written answers to these questions.

Lastly, in July 2014, JHI coordinated a cross-case study discussion on overall reflections and experiences of using this methodology. The notes of this discussion were also captured, and the reports of each case to the other partners were transcribed.

All these pieces of information – the results of implementing the methodology, as well as the debriefing interviews which focused more on the process, as well as the general judgements discussed in July 2014 – have been used to write this deliverable. To facilitate this, the software package Nvivo 10 has been used to help store, manage and search these data.

3.4 Criteria for evaluation of scenario-planning experiences

The criteria used to design the COMET-LA methodology (section 3.1) have also been used to shape our analysis and evaluation. These criteria allow us to ask if methodology was useful as intended, and thus if and how it may be able to support CBNRM. Our criteria are:

(1) Is the methodology worthwhile to implement?
   a. Is it practically feasible in each case study?
   b. Does implementing the method bring benefits i.e. is it useful?
   c. Does the value of the methodology make the effort worthwhile?

(2) Did the methodology produce benefits of the type needed to strengthen CBNRM?
   a. Does it support systems thinking, particularly to link social and ecological issues?
   b. Does it promote adaptive capacity – the ability to consider and respond to future change?
   c. Does it encourage participation of community members and their knowledge?

This criteria shape the analysis of the methodology presented in the following section. These criteria should be relevant to evaluating the effect of any scenario-planning method – indeed any tool or approach – intended to improve and strengthen CBNRM practice. See box 4 for discussion of an additional criterion specific not to CBNRM but this project.

Box 4. Did the methodology connect with previous work of the project?

Section 3.4 summarises criteria for evaluating the use of scenario-planning for CBNRM. As well as these criteria, every initiative to strengthen CBNRM will also have unique criteria specific to the local and/or project goals. For this project we needed the methodology to connect with and build on the previous project activities, consistent with the work of Godet. The criterion is one specific to this project, and so is discussed separately here.

The work of COMET-LA has been strongly influenced by the philosophy of 'la prospective' and techniques of 'Prospective Structural Analysis' as developed by Michel Godet (see Box 2). When the methodology had been designed, the work of Godet had been a primary consideration when selecting and adapting methods for COMET-LA (section 3.1, page 9). In the final methodology, the influence of Godet was primarily reflected in the step of morphological analysis. As well as being compatible with the philosophy and ethos of Godet, this step should have allowed for the use of information about the system, in the form of key influential and dependent variables that had been created during earlier work of the project. However, other methods advocated by Godet's method (e.g. MACTOR) were not carried out: partly because some of these issues had already been discussed somehow by earlier steps in the project; and partly because these additional steps would likely require more time and effort than was possible within the project timespan.

Since morphological analysis was carried out in all cases, these variables were used. However, to make the size of the task manageable, it was judged that only a few system variables could be used. Thus each CS selected between 7 to 10 variables. This means that some information from previous steps had to be discarded. Each CS selected their subset by focusing on the most influential and dependent variables, thus using systems information generated in the previous step: Colombia used modeling and discussions to refine their selection. Once the morphological analysis had been completed, facilitators were encouraged to revisit the discarded variables when developing and elaborating the scenarios. Practical constraints of time and attention may limit the size of tasks that can be carried out with communities. Therefore it seems inevitable that Godet's methods are not entirely suitably for locally-adapted and participatory scenario-planning. However, as far as possible this methodology was consistent with Godet, and tried as far as possible to use information collected in previous steps.

4 Evaluating experiences of applying the COMET-LA method

This section begins by exploring overall judgements of the scenario-planning methodology. It then goes on to unpack these judgements, by asking specific questions of the methodology, as per the evaluation criteria: were all parts of the methodology feasible? Was the methodology worthwhile? Lastly, for those parts of the methodology that were feasible and did offer benefits, does it offer benefits useful for strengthening CBNRM (i.e. promote adaptiveness, encourage participation and learning, support systems thinking)?

4.1 Overall judgments on the COMET-LA scenario planning methodology

All three case studies were able to implement all four stages of the methodology, and produced the expected outputs. Martin Ortega et al. (2014) summarises the outputs of each case. This is excellent, as it suggests the methodology was generally feasible to implement.

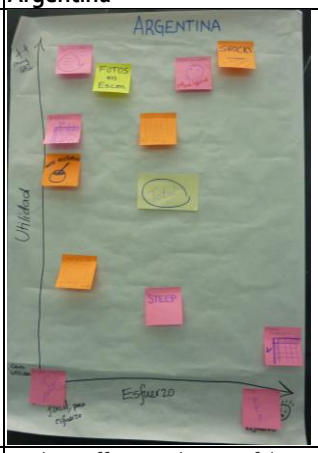
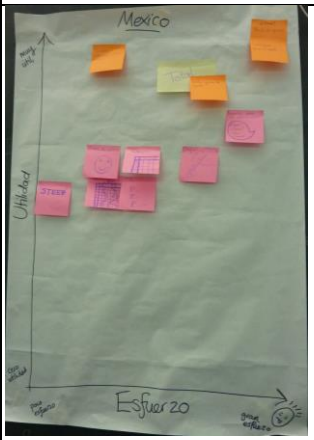
Table 2 shows each partners' judgement of the methodology as implemented in their case. The graphs display utility versus effort, and thus are designed to explore their informal judgments about the efficiency of the process – in other words, if it was "worth it". The yellow postits in the graphs represent judgements about the methodology as a whole. As can be seen from their location, across the cases the methodology was judged to require medium-high effort (represented by locations on the mid- to right-hand-side of the x-axis). The graph also shows that the methodology was judged to be medium to high usefulness (represented by locations on the mid to top of the y-axis). This is very positive, as this shows that in case, implementing the methodology was deemed worthwhile.

It was expected that each case would need to make adaptations to the methodology, in order that the method be tailored to the context and needs of the case study system and partners. This occurred, and furthermore, in two cases (Argentina and Colombia) some additional techniques were added as was judged appropriate by the partners in order to complete the work and engage with the communities. These adaptations were made for a variety of reasons: to reflect differing constraints on time available to spend with communities; to reflect perceived interests and capabilities of communities, and the interests and capacities of partner staff; and also to react to changing external events e.g. civil conflicts arising during implementation. Stage 4 was perhaps the part of the methodology that altered most during implementation: the discussion of the implications of response options was carried out in each case, but the questions provided by the methodology were entirely adapted or supplanted, asking quite different questions in each case.

These outputs and experiences tell us that the methodology was overall feasible and worthwhile to implement. This provides a simple answer to the first two evaluation criteria: the methodology was practical feasible to implement, and it was deemed to be worthwhile to do so. However, looking across the cases highlights a few specific steps or techniques where this was not always so: differences in their experiences and judgements are particularly useful for understanding pros and cons in the feasibility and utility of these techniques. Therefore, the next section explores in more detail what parts of the methodology were or were not judged feasible.

Table 2. Judgments of the COMET-LA scenario-planning methodology as made by partners for each case.

The graphs assess efficiency, as represented by placing postits on a graph of usefulness or utility (X-axis) versus effort (Y-axis). Yellow postits represent judgement of overall methodology, pink and orange postits represent judgments of separate components or steps within the methodology.

Case study	Argentina	Colombia	Mexico
Graph			
Overall judgment	Medium effort; medium usefulness	High effort; medium/high usefulness	Medium/high effort; high usefulness.
Activities that were "worth it" usefulness ≥ effort	¬ Navigate the morphological matrix guided by archetypes ¬ Identifying robust response options ¬ Scoping implications of robust response options	¬ Using STEEP to select drivers ¬ Identifying robust response options ¬ Consider shocks ¬ Scoping implications of robust response options	¬ Using STEEP to select drivers ¬ Morphological analysis ¬ Navigate the morphological matrix guided by archetypes ¬ Using 7 Ps to identify response options ¬ Identifying robust response options ¬ Consider shocks ¬ Scoping implications of robust response options
Activities that were not feasible	¬ Consider shocks	¬ Navigate the morphological matrix guided by archetypes ¬ Using 7 Ps to identify response options	(None)
Activities that were not "worth it" - usefulness ≤ effort	¬ Morphological analysis ¬ Using 7 Ps to identify response options	¬ Morphological analysis	(None)
Additional activities	¬ 'Mate historico' – a social activity to discuss past changes	¬ Crossroads tool (explore interaction of variables)	(None)

4.2 Was the methodology worthwhile to implement?

4.2.1 Was the methodology practically feasible?

The graph-making exercise and subsequent discussion showed that the methodology was overall considered feasible. There was only one case where a specific technique was not implemented in any form: in Argentina it was not possible to discuss shocks. However, this was due to time constraints that arose after the participants attention at meetings was diverted to focusing on a fisheries conflict that arose due a change in law passed halfway during the process. However, the team thought that discussion of shocks might have been practically implementable, and probably would have been useful. Furthermore, the other two partners *did* find it useful to discuss shocks, and both reported that this helped to reinforce the need to find specific and robust response options. We conclude that discussing shocks is a

feasible (and useful) step for a scenario-planning methodology. At the same time, the Argentinian experience highlights how any process or methodology is vulnerable to contingencies and events that cannot be anticipated or controlled by the facilitation team, despite their best efforts.

The discussion around the graph-making exercise gave a clear message, that although the steps of the methodology might be feasible to implement, they were often not easy or simple to implement. The interviews with partners during each stage of the process had also reinforced this view. For example, in an interview with a representative of the Colombian partner, in July 2014:

> *…we have to make very big adaptations for it to work properly and to be very…I don't know to be appreciated also by the communities you know?*

Considerable care was needed to understand, communicate and implement the methodology. The work that is carried out with communities in meetings and workshops is often only a small proportion of the work carried out by the facilitators. Time is needed to understand the rationale and detail of each stage, and to plan and prepare identify how to adapt the work to carry out with the community. Thus, implementing the methodology is not an 'easy option' and it is essential to understand what benefits, if any, it may provide.

4.2.2 Was the methodology useful?

The previous sections established that not only was the methodology mostly implementable i.e. practically feasible to carry out. This section identifies what benefits resulted from this work. In Table 3 we present a summary of the mains strengths and weakness associated with each stage in the methodology, as synthesised from reports and discussions with partners. In general the potential strengths and opportunities associated with each stage (presented in the first column of the table), tended to outweigh the potential challenges (presented in the second column of the table): hence the useful positive evaluations of whether the method was 'worth it' (section 4.1).

A comparison of Table 1 and Table 3 shows that in general, observations about the advantages and opportunities voiced correspond with the original rationale for choosing the step or technique. However, in addition to these, some benefits or strengths that were reported do not exactly correspond with the expected benefits or rationalisation for choosing specific techniques, as listed in Table 1. This table shows the value of considering not only expected benefits but also scoping for other impacts and effects (both positive and negative). For example, the rationale for discussing shocks in stage 3 was to reinforce and extend the discussion about robustness – the need to find response options that would be feasible and useful in a range of possible futures. However, this step was also cited as helpful for making ideas both more specific and more grounded, helping a move beyond vague aspirations.

> *When you have the brainstorming around the response options they start talking and start dreaming somehow and they start talking like if everything is going to be easy and everything is possible, everything is going to be just as they wished it was and when we started … what they had to do was "okay, hold it", and now let's think about*

if this is real and its going to be useful in the conditions that we have nowadays

Colombian partner's observations about community changes during stage 3

Although most steps were associated with challenges as well as benefits, most of the component steps and stages in the methodology were deemed worth the effort of carrying out. This is also represented in the charts in Table 2, where a many of the postits are clustered around and above the right-hand-diagonal.

Table 3. The main benefits and challenges of each stage in the COMET-LA scenario-planning methodology.

	Advantages and opportunities	Disadvantages, risks or challenges
Stage 1 Explore how drivers of change may influence the system	¬ Can promote awareness that changes will happen, for many reasons, and cannot be avoided. ¬ Develops a systematic understanding of how various drivers may affect local systems ¬ Promotes consideration of both external drivers and internal issues	¬ Suggesting or discussing external drivers of future change may seem irrelevant or less immediately salient than ongoing issues and internal sources of change ¬ Synergistic or mediated interactions between multiple variables and multiple drivers may be difficult to capture using a 2D driver-variable matrix
Stage 2 Construct alternative future scenarios	¬ Archetypes can help simplify the job of navigating the matrix ¬ Writing qualitative narratives can help to capture complexity and any issues noted in previous step ¬ Written (or spoken) narratives can be more accessible and understandable than a 2-D matrix	¬ Archetypes can be seen as an imposition, rather than a useful guide ¬ Normative views i.e. of desired futures, can complicate and attempts to generate purely exploratory scenarios ¬ A possible tendency to simplification of scenarios, can reduce the nuances and realism of scenarios
Stage 3 Identify robust response options	¬ Can help to identify new activities ¬ Can help to revise and reprioritise ongoing and planned action ¬ Explaining robustness helps to focus on the need for 'future proof' strategies ¬ Discussing shocks can help emphasise need to consider future change	¬ Discussing response options can be seen to risk unnecessarily duplicating existing plans and projects
Stage 4 Discuss implications of response options	¬ Can promote a focus on turning aspirations into planning future practical steps ¬ Can help to update and give impetus to existing activities and plans ¬ Can help identify links between plans, and issues ¬ Can help identify where multi-level and multi-actor coordination is required	¬ Can risk frustration if implementation of response options identifies a need for action by actors not previously engaged in scenario-planning process ¬ Difficult to know how to structure the discussion in a way that explores all possible implications
Common observations (not linked to specific steps)	¬ Can help promote /develop systems thinking ¬ Can help develop community dialogue and awareness on the need for planning	¬ Resource intensive (in terms of people-time) ¬ Complex to explain & understand

We later discuss in section 4.3 how the benefits in Table 3 relate to the needs of CBNRM. However, since our data show there were three parts of the methodology that were potentially problematic, and perhaps not worthwhile to implement, in the following subsection we first briefly discuss each of these issues.

4.2.3 Steps in the methodology that are potentially problematic

Three techniques or steps were identified as potentially problematic: in stage 1, morphological analysis was an onerous task; in stage 2 archetypes were not always used to guide scenario-creation; and in stage 3, the '7Ps' were not found useful for helping to identify response options. We begin with the step that was most problematic for all three cases: the use of '7 Ps'.

7 Ps The 7 Ps had been provided in the methodology as a means to help prompt and identify a range of possible response options. However, every partner struggled to use it. In Colombia, the use of 7 Ps had not been judged useful and so not fully attempted by the partner. Argentina had tried to use this tool but had found it of little value. Mexico did not condemn the tool but struggled to say exactly how it had been used or useful.

> *It was a great effort, and why? Because it was difficult to explain… a lot to explain to the stakeholders… eh… even when we had the examples, the classification between plans, programmes…*
>
> *Argentinian team's description of their attempt of trying to use the 7Ps to identify response options*

This suggests that the using the 7 Ps did not work well as a prompt to identify a range of response options, and is not a useful part of the methodology to recommend for use in these or other situations.

Archetypes Archetypes were suggested as a way to help navigate the morphological matrix resulting from stage 1, in order to generate multiple contrasting scenarios (Hunt et al., 2012). Experiences with these were mixed: Colombia did not use find archetypes relevant or useful but the other partners had been able to use the archetypes, and found them relatively easy and worthwhile to use. The content of the scenarios themselves may suggest why they were not used in the Colombian case: here, 3 scenarios were produced influenced by a normative approach: their names were "Ideal", "Undesirable" and one "Stable". Because Hunt's archetypes are supposed to support an exploratory approach, it is perhaps not surprising that they are not useful where the creation of scenarios is overtly guided by norms and preferences. Furthermore, the Colombians also developed their own 'crossroads' tool, in which they invested significant time and effort to explore the interactions of pairs of variables, which they judged very useful. This investment of effort in the crossroads tool may have further reduced attention and available time to understand and apply the archetypes concepts.

This suggests to us that archetypes can be a useful tool to help produce scenarios, however, it is not possible or sensible to use archetypes to create scenarios using a normative approach. Furthermore, in order to fully realise the utility of archetypes, it is probably necessary for

facilitators to read the detail of the original paper, so this is not the simplest of tools to communicate and use.

Morphological analysis Table 2 indicates that both the Argentinian and Colombian teams found carrying out morphological analysis – the systematic consideration of how different states of drivers would affect system variables – to be a very onerous task. The position of the relevant postit notes on the charts reflects this – they are far on the right hand side. Discussion with the partners revealed that this exercise could be both challenging to explain, and also take considerable time and effort to carry out. However, discussions with each of the partners also suggested it could be useful, and so worth the effort:

> *they [the community] gave us a lot of information ….that was very useful. And also, they expand the definition we had for the variables because sometimes we were a little bit like limited in the descriptions we gave… But the process of checking one by one the spaces in the matrix ….they were bored, after I don't know one hour they were bored.*
>
> *Colombian team description of carrying out morphological analysis, May 2014*

The ability to encourage systematic consideration of interactions was deemed very useful.

> *…at the beginning when you presented in Faro this method, I was really reluctant to use the methodology [laughter]. But now I think that uh…the method…gave us the chance to analyse some situations in a systematic way… because we are dealing with qualitative information not quantitative information. So now I think that the method is…was perfect for this situation.*
>
> *Mexican team description of the advantages of the methodology, July 2014.*

Thus, it seems morphological analysis may be an exercise which it is worth making the effort to carry out, but requires extreme care to do, and especially likely to require adaption to any specific case. The experiences of the COMET-LA partners, who each made different judgements about how to adapt the task – give useful examples as to how the task can be completed. Solutions ranged for handling the size of the task ranged from working with the community to fill the entire matrix (Argentina), through to partners pre-filling the matrix for revision and validation by the community members (Colombia). Furthermore, each partner used different approaches to presenting the matrix. In particular, the Colombian team also used storytelling and drawings to help create the scenarios, which they felt were more engaging and less constraining, although drawing does not necessarily prompt a consideration of all issues in the same way as morphological analysis.

Therefore we conclude different things about each of these problematic tasks: (1) the 7 Ps is not an technique worth using again, but alternatives are required; (2) archetypes can be a useful guide to help scenario-creation, but not if a normative idea is also used to create the scenarios; and (3) morphological analysis is onerous but worthwhile, so its facilitation and adaption warrants special care and attention.

4.3 Did the methodology produce benefits relevant to strengthening CBNRM?

This section asks if there was evidence that the methodology produced benefits relevant to strengthening CBNRM. It is structured into three subsections, following the three needs earlier identified for CBNRM (see section 2.1), although many interconnections between the issues are noted throughout.

4.3.1 Did the methodology support systems thinking?

The first need to support systems thinking may have been of the main benefits arising from the overall process. Partners noted that both the communities – and on occasions themselves – further developed this perspective:

> *the fact of identifying the variables and the drivers of change, allow the community and also us* [the project partner] *to have the system thinking because:... you have all those variables in mind, you were not only talking about maybe only one*
>
> *Discussion of stage 1 and 2 with Colombian partners, May 2014*

The quote above, and other examples, suggests the activities associated with morphological analysis may have been particularly helpful for promoting a systems perspective. It was sometimes hard to detect exactly how this was encouraged by the methodology; since across all the cases, interviews at other stages also suggested benefits to systems thinking. For example, the Mexican partner's judgment on the main benefit of using the methodology, in July 2014, focused on the interconnections prompted by discussing response options:

> *This enabled us to find the complexity of relationships. This is the central issue. Obviously, for systems of this nature, with these characteristics, linearities are very scarce. Actually, they are complex systems essentially and this is what is important, because at the end, also the solutions have a variety of conditions which are very dynamic. They will be important at the time of decision-making.*

This quote suggests that the nature of systems thinking is intertwined with the ability to think about and adapt to the future. It was often hard to probe exactly how systems thinking could be detected, and how it was generated, and these two issues being intertwined is probably one cause of this.

There was no explicit evidence that the links between ecological and social systems received more attention than any others. It might even be that if any subsystem received more attention, it was the interconnections between and within social and governance systems. This may indeed reflect the issues that need most attention to foster community adaptation, or it may reflect a reliance on the topics of local expertise. For example, for stage 4, the methodology provided guiding questions that suggested equal focus on implications for and interrelationships with environmental, social and economic sustainability. However, in practice, each case adapted or supplanted in quite different ways, but in all cases the actual questions asked tended to focus on social implications and actions, rather than effects and feedback from ecological systems.

4.3.2 *Did the methodology promote adaptive capacity – the ability to consider and respond to future change?*

Perhaps the most obvious expectation for scenario-planning is that it will encourage people to think about the future, and hence improve community ability to respond and adapt to future change. Thinking about the future, instead of the status quo, sometimes took some initial effort to explain and justify. However, all cases eventually succeeded in doing so, due to the skilled facilitation and efforts of the partners. Their ability to think about the future is evidenced throughout the numerous outputs and discussion notes produced from the workshops in each country, even in situations where the medium to long-term future was previously rarely considered:

> *Looking at a time horizon of twenty years enabled participants to perform an exercise in perspective in a country where there are no political agendas in twenty years…and another very important thing of this methodology is that, having done this exercise at twenty years sight, directly or indirectly, each stakeholder revealed* [themselves] *self-responsible.*
>
> *Argentinian partner's description of ideas discussed at the workshop for stage 1*

This quote also highlights how a discussion about the future could foreground the topic of responsibilities. Once communities were thinking about the future, their ideas often seem to have highlighted the role of different individuals and organisations on the management and state of the natural system. In the case above, this discussion about the future, and flagging of responsibilities spontaneously led to a discussion "*on the need to work together as a community*".

4.3.3 *Did the methodology encourage participation of people and their knowledges?*

The methodology did foster discussion between community members, and fostered shifts in their thinking and ideas. Perhaps the most overt effect was in Argentina, where previously there had not been a strong sense of community, or formally defined organization to represent. By the end of the process there, it was judged to have made a significant contribution to "*internalizing*" the idea of collaborating together. In the other cases of Mexico and Colombia, the process started in settings which already had a stronger sense of community, and legally-recognized community rights to self-governance: in these cases, unsurprisingly the benefits to empowerment were there less overt. However, in these cases the process still provided an additional venue to share ideas on problems, different interests, and potential responses. This process seems to have influenced perspectives on the future, key challenges and subsequently the actions that must be taken:

> *During the workshop you can perceive that they are a little bit more…uh…aware that they have a lot of vulnerabilities and that they have to be even stronger nowadays than maybe what they thought a few years ago, because the context is not easy. So…maybe new knowledge, like any new idea or anything very very very…like that hasn't been taken into account never before, maybe not. But you can feel that they*

have been changing their…like their expectations and what they are hoping to be in the future has forced them to do that.

Colombian partner's reflection on the benefits of Stage 3

So, the process influenced the perspectives and new ideas about the system, community and possible responses. However, partners said they rarely noted explicit learning on new topics, or filling of knowledge gaps on specific topics. In fact, the partners said were more likely to learn something themselves: for example, when in stage 3 the Colombian team broached the possibility of a legal change they found themselves surprised that the community had already been thinking about this: "*we never thought that the community councils were going to be as aware as they are*". Indeed, some COMET-LA partners worried that the project overlooked opportunities to provide scientific information to the communities, and overly relied on pre-existing understandings by community. Because of this, changes in community perspectives must have arisen through the topics and structure of the dialogue (rather than introduction of new external ideas), as prompted by the methodology. This focus on using existing local knowledge may have led to missed opportunities to enrich understandings of the socio-ecological system using scientific knowledge, with implications both for the accuracy of systems understanding and the credibility of the outputs with external audiences. However, it does help to ensure community understanding and buy-in to the process and its outputs.

Overall, the COMET-LA methodology seems to have produced some benefits useful to helping communities strengthen their ability to practice adaptive management and strengthen CBNRM. The quotes above are illustrative of examples from different stages which all illustrate the interconnections made between systems thinking, community empowerment and learning, and consideration of the future. For example, in their final judgment on the value of the overall method for Colombia, a representative for the partner said: "*If the project hadn't come, we would not have reflected upon what we would do if adversity comes.*"

4.4 How were these benefits generated?

Our partners found it hard to identify exactly how a specific aspect of the methodology produced benefits. Furthermore, some aspects of the process and outputs may be interlinked in their effects, so were difficult to separate. The final row of Table 3 shows some of the common observations or ideas about why the methodology was useful, but that partners found particularly hard to explain how they were produced. Even though these could not always be confidently ascribed to any particular part of the methodology, they were frequently voiced. In particular, we have already discussed how the idea of systems thinking was something that was thought to be supported by the methodology, but it was often hard to say exactly how.

However, sometimes we are able to link specific types of benefits to one of the four stages of the methodology, because as the methodology was carried out we interviewed partners about each stage, or because a partner was very specific about how a technique produced

benefits. This allows us to identify two aspects of the method that seemed critical to supporting its influence.

The first aspect is the systematic approach to thinking about the future and its implication, particularly via the technique of morphological analysis. We have already discussed how this could be both tricky to communicate and onerous to facilitate (section 4.2.3**Error! Reference ource not found.**). However, it was also cited as useful, particularly for promoting a systematic approach, which was seen linked to systems thinking. In particular, the consideration of detailed linkages prompted by carrying out the morphological analysis – and displaying the resulting matrix – is thought to have helped develop and reinforce a systems thinking perspective:

> *…identifying the variables and the drivers of change allow the community and also us to have the 'system' thinking, because like you have all those variables in mind, you were not only talking about maybe only one, you may be talking about the productive systems or maybe only about the forest….it allowed the people also like to be aware … "okay wait a second they're missing these points", "okay, in every culture we can have this" but also "don't forget in gold mining we have this, and tourism we have this", and so the matrix and the display also of the matrix was very useful for the systems thinking because you are not only talking about one little aspect of the system but the integrity of all of them and also the drivers of change, like putting one issue related to another.*

Colombian partner's answer to a query about how the morphological analysis had promoted systems thinking, subsequent to carrying out stages 1 & 2 in May 2014

The second aspect is the discussions about response options and their implications. Discussing response options also seemed relevant to generating the benefits of systems thinking, since it entailed consideration of the interrelationships between different responses, actors and the system. Linked to this, discussing response options was also beneficial for helping people to focus on a practical perspective, i.e. steps to be taken to ensure adaptions. For example, an interview with the same Colombian partners later in the process:

> *The opportunity of starting a planning process through the consideration of the main implications for the response options execution represents a fundamental step in adaptive management and systems thinking. Also, the workshop allowed the participants to imagine the possible networks that might emerge during the implementation of the response options, by identifying the actors potentially involved. Finally, the variety of the response options revealed systems thinking, not only because all the main issues of the community are addressed, but also because the response options are somehow related to each other and their achievement is expected to generate synergies.*

Interview with the Colombian partner about stage 4

Carefully thinking though the responses needed, in terms of their detail and social and environmental implications, was important for *"grounding"* discussion, encouraging community members to move beyond aspiration and towards detail and practical planning. For example, more than one case discussed the need to improving and altering the emphasis of education, or strengthening leadership.

As the quote above suggests, the outputs of this phase of work also highlighted that most robust response options always depended not only on community action, but support from actors at other institutional levels. For example, improving and adapting education typically requires permission and/or resourcing from state education departments. Other types of response actions might require liaison with diverse actors from planning departments, water supply companies or extractive industry. Partners had made laudable efforts to interest or engage these groups, and some had run separate meetings either to inform them, or even conduct elements of the work in parallel with the communities. However, non-community actors generally had little interest or immediate incentive to engage in such processes. This is particularly true for extractive industries (as in the case of Argentina), and for organizations or agencies grappling with civil conflict and other urgent issues (as in the case of Colombia). Thus, these organizations have little 'buy in' to the scenarios and planned response options produced. This is particularly problematic where communities have little or no formal recognition or legal standing, as in Argentina:

> *The problem facing their governance action… is that plans exist but are not enforced. And I said to them: 'what will you do to make the plans succeed?'. And they answered me: 'social protest'. In Argentina there is a big discussion right now about social protest. Social protest is the only thing that has given us the result at some point.*
>
> *Discussion about response options and planning with Argentinian partner, June 2014*

This raises an important question about the potential of community-based scenario-planning – or indeed any tool – to support and strengthen CBNRM, when local systems are inevitably affected by the actions of others.

5 Discussion

What does the COMET-LA experience tell us about value of scenario-planning for CBNRM? A purposely-designed scenario-planning methodology proved to be implementable in three different case studies, and produced several benefits. Long-term monitoring will be required in order to be able to fully evaluate all effects and influences (Lindenmayer & Likens, 2009), but some benefits were already apparent during the experience. These benefits were judged relevant and mostly worthwhile by local partners, and also seem relevant to addressing the needs identified for CBNRM in general.

Firstly, the scenario-planning provided a space for dialogue. Since perspectives changed without much external knowledge input, the process seems to have promoted shared or social learning. This is by itself not remarkable: this might be expected of any process or method where external facilitators repeatedly, carefully and respectfully engage with a community (Reed, 2008). Indeed, resources given to facilitation may be one of the biggest factors influencing the success or failure of any method designed to improve CBNRM (Hagmann et al., 2002). However, the methodology may have been particularly helpful for encouraging participants to open up: although it was sometimes difficult to introduce a discussion about a future 30 years ahead, thinking about the future can encourage more freely voiced ideas and opinions than if the status quo were discussed (Peterson et al., 2003).

Secondly, the process of dialogue seems to have promoted the development of systems thinking. This may help to support and explain how other studies that have found scenario-planning can help people reassess their understanding of systems (Greeuw et al., 2000 in Peterson et al., 2003). It was not always easy to determine what gave rise to systems thinking, but it seems that thinking systematically about the interactions between issues may have been key (for example between drivers and variables, in morphological analysis). The use of large matrices to explore the effect of drivers on variables demands a large investment of time from both facilitators and community, but this effort may be worthwhile as it allows people to think through multiple issues and connections. Furthermore, the attention to response options seemed particularly useful for encouraging discussion about interconnections in detailed actions needed for implementation, and so helping the community to move beyond aspirations to planning what they could do, and how. This effect on systems thinking is particularly valuable, since at present there are few proven approaches that can promise to aid systems thinking (Best & Holmes, 2010), and few examples of CBNRM that can demonstrate consideration of multiple issues and connections.

Lastly, the scenario-planning method, as might be expected from its design, helped promote consideration of future change and the effect of external forces on local systems. This, together with the consideration of interactions (particularly as promoted by the systematic consideration of drivers on variables) is relevant to addressing the need for CBNRM to be more adaptive (Armitage, 2005). Of course, a single event of scenario-planning will not, by itself, promote the sustained iterative approach to planning and management that is necessary to manage complex systems. However, the careful consideration of response options, including detailing exactly how they will be implemented, should highlight if goals and plans need to be revisited.

5.1 Recommendations for future CBRNM practice

Benefits from scenario-planning were achieved and deemed worthwhile in the three disparate cases: this suggests the methodology would also be suitable and useful in other situations. In particular, it is useful to consider morphological analysis in order to scope how drivers affect local systems since this can promote a discussion about complexity and scope possible interconnections. Being systematic in considering links between issues seems to help systems thinking, even if it is sometimes onerous.

Furthermore, the COMET-LA experience suggests it can be useful to plan a scenario-planning initiative that ensures participants' energy and time is not entirely devoted to developing the scenarios, but also to using the scenarios. In the literature, discussing response options receives relatively less attention than creating scenarios, but a systematic discussion of potential responses is of vital importance if scenario-planning is to be useful for CBNRM (Wright & Goodwin, 2009).

In all three of the COMET-LA cases, the communities and facilitators already had some knowledge about their local system. Those looking to borrow and build on the COMET-LA methodology may therefore also need to preface their scenario-planning with a step to identify and compile key variables in the social and ecological components of their system. This may seem discouraging, and add to the effort required: other types of scenario-planning that do not explicitly demand this information may seem more attractive! However, we argue that whatever scenario-planning method is used, it is best for this to build on a considered and explicit description of the system, to safeguard against overlooked issues and unintended consequences, and to consider both social and environmental issues. It may also be useful to explicitly list how different sources of knowledge are used (i.e. different types of science, different local views) in order to ensure no one view or perspective be overlooked.

5.2 Questions raised by this study, and future needs for research

Even though this study carefully monitored the implementation of the COMET-LA scenario-planning methodology, our evaluation does not allow us to detail exactly how all its effects were achieved and by which different aspects. This reflects on the limits to what can be confidently concluded on the basis of three cases: ideally, more evidence is needed, based on testing of an updated version of this methodology and alternatives. This also reflects on the nature of evidence needed to fully understand the process and its effects: this would require tracking the views and understandings of participants throughout the process, ideally using a mix of ethnographic methods. Tracing the processes by which new perspectives on future change, systems thinking and local empowerment evolve, is an important challenge for future research: it should be integrated into any new initiatives to attempt to implement scenario-planning for CBNRM. It could even be linked to comparative work to explore the pros and cons of different aspects of these and other methodologies (Lynam et al., 2007).

A related challenge is identifying if and how different forms of knowledge are used. This methodology emphasised eliciting and using local understanding and knowledge as the basis of the scenarios. Depending on how the methodology was interpreted and adapted by each

partner team, this was achieved to differing extents and differing ways. However, focusing on local understanding may have potentially under-used or under-valued the potential insights that scientific knowledge could have offered on the effects of future change. This is a problem that has been observed for other attempts to promote empower local people to manage their own socio-ecological system (Epstein et al., 2013). Thus, research to trace if and how scenario-planning achieves influence should also consider of how knowledge is co-constructed in this process (Chermack, 2003).

One particular topic that should be focused on by such research is the development of systems perspectives. In COMET-LA, the suggestion that scenario-planning may have helped develop systems-thinking is particularly notable given that each case had already spent two years developing and recording systemic understanding of their local socio-ecological system. It is an open question as to whether the previous two years of work had created enabling conditions necessary in order to detect the shifts seen during scenario-planning, or whether these shifts would have been seen regardless. The only way to answer this question is to attempt this methodology in other situations.

As well as calling for improved evidence on all scenario-planning experiences, we also identify a couple of specific aspects of the methodology that we can already identify as requiring more attention. Firstly, one key question that we identify as a result our experiences, is if and how to incorporate the normative approach to scenario-planning. Within the literature relating to environmental management, examples of scenario-planning tend to take an exploratory approach, as did we. However, in this project we found normative judgements and preferences tended to influence the final scenarios created. If a normative approach is to be taken, it would be better to be planned, since it can affect the choice of other steps in a methodology. We suggest combining normative and exploratory approaches needs more attention, both in terms of the potential methods for doing so and the results that may be achieved. For example, it is possible that a normative approach might decrease the credibility of outputs with external actors, yet these same actors may actually need to better engaged in scenario-planning if they are to lend their support to the responses community identify as a result of the process. Exploring potential pros and cons of different options is vital.

Secondly, more work is needed on how best to elicit and structure discussions about how to use the scenarios to actually inform future planning. The COMET-LA methodology had suggested the use the 7Ps as a prompt to identify a full range of potential actions as per (Low Choy et al., 2012), but no case found this useful. Similarly, we provided suggestions about how to discuss the environmental, social and economic implications of response options, but the actual questions used by each partner did not exactly mirror the originals suggested in our methodology. However, as far as we are aware the literature provides little guidance about how to structure either the elicitation of response options, or discuss their implications and interactions for adaptive governance. Instead, many examples of scenario-planning focus nearly entirely on how the scenarios were created, with less attention to if and how they were used (Bishop et al., 2007). Some other examples assume that response options are already self-evident, and thus just discuss how to incentivise and implement them (e.g. Vira et al., 2011). This gap in the literature should be rectified.

6 Conclusions

The COMET-LA project trialled a purpose-made scenario-planning methodology, designed to support CBNRM in 3 different case studies (in Colombia, Argentina and Mexico). These cases differ in many ways: in their goals, social context and ecosystems. However, all cases share a need to better consider climate and other future changes, in order to plan responses that will foster resilience.

The method took an exploratory approach to scenario-planning, and trialled the use of 'morphological analysis' to explore the effect of drivers on local systems, in order to create coherent narrative descriptions of possible futures (scenarios). The method also placed emphasis on finding robust response options (potential actions that could help achieve goals and foster community adaptiveness, given more than one possible future). The methodology was designed to build on previous project work: in particular to be compatible with taking a socio-ecological systems perspective (building on the work of Ostrom, 2009) and the techniques advocated for supporting planning by Godet (1994).

An evaluation of experiences and outputs of this methodology, using criteria of feasibility, efficiency and relevance to CBNRM, shows that the methodology seems to have produced several benefits. These benefits correspond with the changes needed to strengthen CBNRM (Shackleton et al., 2010): development of socio-ecological systems thinking; consideration of future change; and encouragement dialogue and participation of community members. These benefits seem to critically depend on the methodology's emphasis on taking systematic (if onerous) approach to considering relationships between issues, as well its emphasis on reserving energy and attention to discussing how to respond to scenarios.

However, the COMET-LA experiences do highlight a question about how far this or any tool can support local adaptive management, given that many of the response options identified require involvement or support from external actors. If external actors were not involved in the process – and the scenarios are derived mainly from local knowledge – these external actors may have little interest or buy-in to the process' outputs. This suggests that focusing on multi-level scenario-planning, and exploring if and how multiple knowledges can be used, may be important avenues for future research and practice. The report also highlights other challenges for research and practice; in particular, since response options are under-studied, more work is needed to better understand how to guide the identification and exploration of response options in order to inform practices and support adaptive governance. Furthermore, understanding exactly if and how these benefits are produced, in comparison to other techniques will be valuable (for example, scenario-planning is not the only approach able to foster better community participation and dialogue).

Despite the need for more research, we understand enough to know that scenario-planning can be a useful a tool to support and improve CBNRM. Furthermore, we suggest the COMET-LA methodology is a specific approach to consider, since it was able to be implemented in very different cases. With adaptation, the specific techniques within it could also be used and useful in other settings, whilst overall the COMET-LA experiences provide useful examples for those seeking to strengthen CBNRM in other settings.

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