



# The COMET-LA scenario-planning methodology



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This document presents the common methodological framework that guided scenario-planning work in 2014 by partners involved in the “COMET-LA” project ([www.comet-la.eu](http://www.comet-la.eu)).

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This document describes a common methodological framework that guided scenario-planning in 2014 by partners in three countries, as part of the “COMET-LA” project. It may be of interest to others seeking to design a participatory scenario-planning processes, particularly where a socio-ecological systems perspective is taken, and where the aim is to support local adaptive management and environmental governance.

We welcome feedback and thoughts about this methodology. If this methodology is influences any scenario-planning processes we request this document is cited following the format below, and the authors would be grateful to be informed (you can email us at [cometla\\_jhi@hutton.ac.uk](mailto:cometla_jhi@hutton.ac.uk)).

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## Background to the creation of this methodology

This section explains how and why the methodology in this document came to be created.

### What is the COMET-LA project?

COMET-LA is a 3-year project (running from January 2012 to January 2015) that aims to identify sustainable community-based governance for the management of natural resources that could be used in different social-ecological systems in a context of climate change. COMET-LA was funded by the European Commission under the Seventh Framework Programme, Grant agreement no: 282845. More information about COMET-LA is available from [www.comet-la.eu](http://www.comet-la.eu)

COMET-LA involves action research in 3 contrasting case studies: in Argentina, Colombia and Mexico. The work comprised 3 stages: in the first year, project partners worked with them to describe the socio-ecological system; in the second year of work they systematically considered how different elements of the system interacted; and in the third year of work they considered future change and how that might affect these systems. It was anticipated that these activities would aid the communities to be better able to plan and carry out adaptive management that helps achieve their social and environmental goals. Although it was hoped that COMET-LA activities would contribute to effective governance, this was not assumed, and so COMET-LA has also asked if and how its methods have been useful. This document describes the scenario-planning methodology used to guide work in year 3 of the project.

### Why attempt scenario-planning?

The process of developing scenarios is thought to be useful for several reasons. The process can help the individuals involved to share and reconcile different knowledges, make explicit different ideas and expectations, and to discuss aspirations over the management of socio-ecological systems. The outcomes of scenario-planning processes, i.e. the resulting scenarios, can help stimulate discussions about stakeholders may respond to future challenges. Thinking about the future may also help people to discuss their goals and interests and negotiate conflicts.

**What is a 'scenario'?**  
A scenario is a coherent, internally consistent, and plausible description of a possible future state (including both social and natural aspects). It is not a forecast; rather, each scenario is one alternative image of how the future can unfold.

Thinking about the future can be challenging, especially if people have many pressing and immediate problems e.g. in sustaining their livelihoods. However, evidence from past studies across the world suggests that, with good facilitation, most people are capable of thinking about the future and they find it beneficial for helping them to share knowledges and inform plans. Both the process of creating the scenarios, as well as the scenarios themselves, may help to stimulate dialogue and ideas about how to respond to future changes and challenges.

### How was the COMET-LA methodology developed?

There are many different approaches to creating scenarios. There is no 'right' and 'wrong' way of creating scenarios, but each method or technique offers pros and cons that must be carefully considered before work commences. In order to identify a method appropriate and useful for COMET-LA, The James Hutton Institute was assigned the task of developing the common scenario-building methodology. This was drafted in December 2013 and, after feedback from partners,



finalised in February 2014. The methodology was then implemented in each case study site March – July 2014.

The methodology was developed by taking into account four considerations.


- We studied the current best practice in the literature on futures thinking and scenario-planning. We reviewed the diversity of methods in use by the literature. We considered a wide range of options and specific techniques. For example, we discovered that although the 2-axis method is a common way to construct scenarios, and was popularised by the IPCC, there are many other options for doing this. Some approaches are ‘exploratory’, others are ‘normative’: we decided to opt for an exploratory method, to focus on the range of possibilities. We noted that many examples of scenario-development came from business or military settings, and thus might be difficult to use with communities for natural resource management, as in COMET-LA. We do not explain here the details of our literature review and the options considered, but are happy to discuss and explain on request.
- We reviewed the global storylines of change used and developed by other projects, since these could help to provide ideas of external drivers of change that would be relevant and credible for use to consider what drivers might in future act to influence the COMET-LA case study systems. In identifying drivers of change for use by this project we were particularly influenced by the work of the Millennium Project which had used a Delphi Method to scope drivers of change for the Latin American region (<http://www.millennium-project.org/millennium/DelphiLatinAmerica2030.html>).
- We considered the previous activities and outputs from the COMET-LA project, which had first characterised the case studies in terms of socio-ecological systems, building on the work of Elinor Ostrom, and had then described the connections between issues, following the methods of Michel Godet. It was important that the COMET-LA scenario-planning work built on and used the knowledge that had been collected in these phases of the project. Please see the COMET-LA deliverables 1.2, 2.1 and 2.2, 3.1 and 3.2 and 4.1 and 4.2, for more information about these activities and outputs, available from <http://www.comet-la.eu/index.php/en/publications.html>
- We considered the need for one methodology to be applicable and adaptable to a wide range of situations encompassed by the contrasting case study systems in Argentina, Colombia and Mexico. These cases had encompassed: different ecological settings i.e. from coastal fisheries through to tropical rainforests; different social and ecological challenges i.e. from mining pollution through to emigration; and different social and cultural contexts i.e. from local community control of territory through to top down state control of access to resources.




## Implementing the methodology

It is important that the methodology be implemented by teams that include skilled facilitators. Many of the challenges and approaches to implementing this method are generic to any kind of facilitated stakeholder engagement. For ideas about how to facilitate scenario-planning processes, O'Brien, F. A. 2004. *Scenario planning—lessons for practice from teaching and learning*. *European Journal of Operational Research* 152: 709-722, usefully highlights some of the potential pitfalls and tensions to be navigated and is available from <http://www.hawaii.edu/serials/files/obrien.pdf>.

## Flexibility in implementation

This methodology is best seen as a framework that leaves much scope for flexibility in its implementation. We provide some suggestions and tips for implementation, to facilitate work with communities. However, these are only suggestions: we do not provide a detailed guide to facilitation, as we recognise that every situation is different, and every facilitator will have a different approach to working with their stakeholders, the order in which they wish to ask questions, etc. For example, different initiatives may each plan a different number of workshops with communities, and use different materials and approaches to describe topics and tasks. We have marked these notes and suggestions using this cloud symbol: 

The document also contains some notes about 'optional extras' - additional exercises that interested teams could carry out – these are not essential but could be interesting for the teams and/or the communities. We have marked these optional extra ideas using this symbol: 

These ideas were provided based on our knowledge of the skills, settings and interests of the original COMET-LA partners: it is quite likely other options are also available.

## Working with communities

This methodology was developed to encourage community participation in futures thinking, and ultimately their empowerment to plan and carry out adaptive management. However, it was anticipated that not every aspect of this methodology need be carried out with the full participation of communities. This is because, where processes are initiated by external teams, there often a practical constraint on the amount of time and resources available to spend time working with communities. There also sometimes a need to avoid stakeholder fatigue. Where this is the case, we suggest that any external teams intending to initiate a participatory scenario-planning process ensure that they save resources for working with communities in the latter stages of the processes. For example, some project teams will prefer to carry out the 'morphological analysis' step themselves by using information already gathered in the previous phases of work, and then take this to communities for validation and/or to fill any gaps. Therefore, the heading of each task notes when community involvement is intended and when it is not: each is marked '*with the community*' or '*by the team*'. For the COMET-LA project, the 'team' denoted the project partners working at each site, but also sometimes included key stakeholders or co-investigators from the community, and sometimes representatives of the Civil Society Organizations.

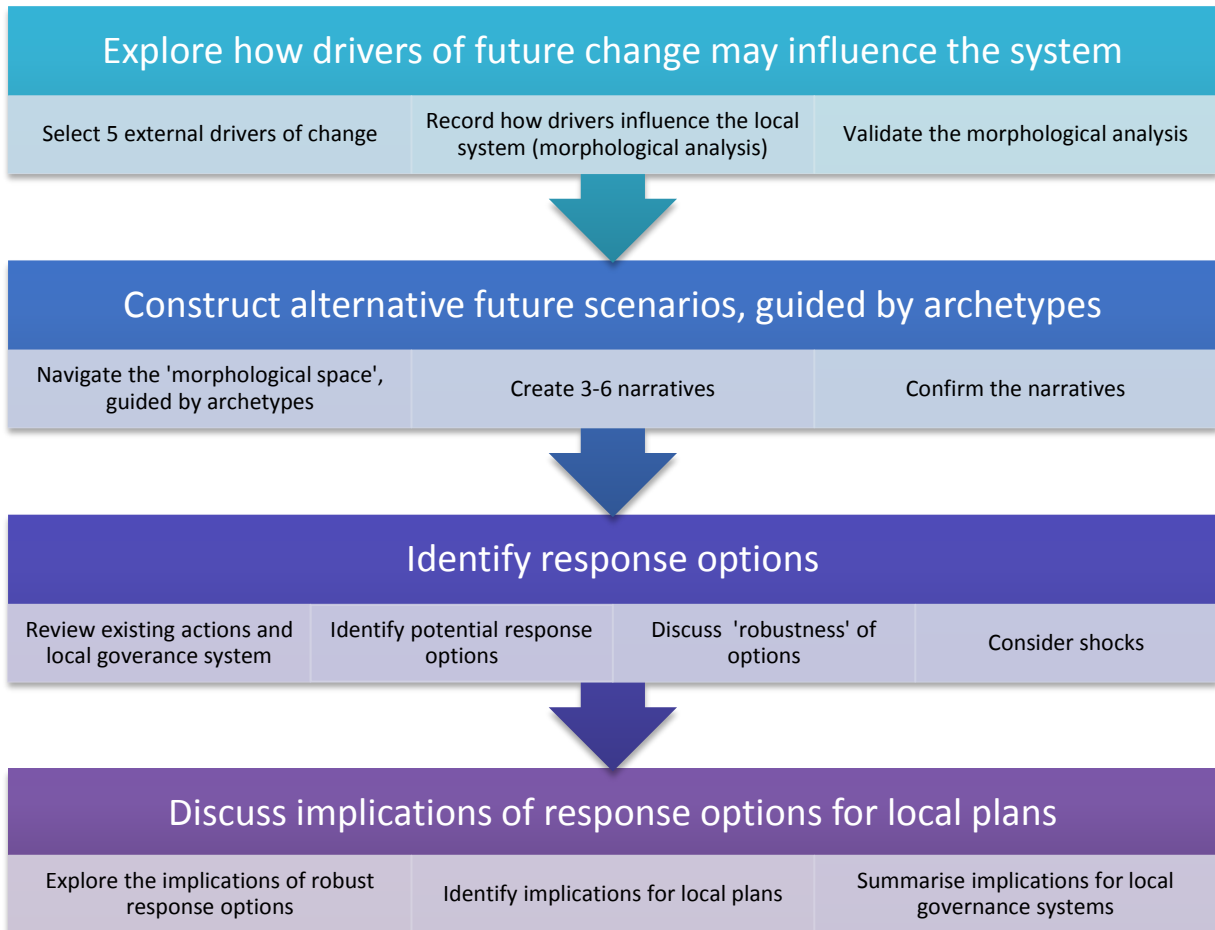
## Monitoring

In order to understand whether using the methodology is useful as expected, it is useful to monitor its implementation. This could provide useful insights for further work in any case study, as well as potentially contribute the wider body of work on scenario-planning. In the COMET-LA project, the team who proposed this methodology were also responsible for monitoring experiences in its use. To understand how we did this, and the results, please contact [comet\\_jhi@hutton.ac.uk](mailto:comet_jhi@hutton.ac.uk).

## Describing the COMET-LA methodology

This flow chart below is an overview of the 4 stages that comprise the COMET-LA scenario-planning methodology. The remainder of this document explains each stage in more detail.

### Overview of the methodology described in this report





## Stage 1: Explore how drivers of future change may influence the system

The aim of this stage is to consider how key drivers of future change may influence the current socio-ecological system.

Drivers of change are key external forces that can act upon a system. Because no one can predict the future, we do not know in what direction drivers will act. For example, everybody thinks that a change in human population size may have big effects, but we don't know whether or not populations will go up or down. However, we do know with certainty that these kinds of forces will have big influences for future systems. Trying to consider the implications of these external forces is what differentiates scenario-planning from 'ordinary' planning exercises.

COMET-LA used a timeline for this work of 20 years (roughly equivalent to one generation).

### a. Describe 5 key drivers of future change – *by the team*

The first step is to identify what drivers to work with, in each case. Previous studies at both a global and regional level have already identified several drivers that we know can be important for affecting the future, but whose direction and effects are uncertain. Previous studies have also suggested that it is useful to consider drivers into 5 different 'STEEP' categories (Social, Technological, Economics, Environmental and Political). Therefore a team should prepare one driver from each of these categories.



It is important that all STEEP categories are covered, to make sure that the scenario work is not unbalanced towards one type of driver (e.g. that not all drivers are of environmental nature).

- i. Consider any existing evidence for what, if any, external drivers are already perceived by communities. Where this has occurred, using these drivers will be very relevant to stakeholders. In COMET-LA, project partners had noted external drivers in the previous stages of work.
- ii. Nominate one driver from each STEEP category, so if any types are missing from previous discussions - for example, if no-one has mentioned external forces relating to technological change – we suggest considering the examples provided in the table below.
- iii. Identify 2 states for each driver: each driver is expected to have important influences on systems, but exactly how the driver will change (i.e. what state they will take) is unknown. For example, human population could decline and/or it could stay the same and/or it could increase. Each of the drivers should be described together with two contrasting states. See the table on the next page for more details.
- iv. If possible, ask another party to check that the drivers are in fact external forces (sometimes it is difficult to distinguish internal and external variables. For this purpose, during the COMET-LA process, case study partners emailed their choice of drivers, including the contrasting states, to the James Hutton Institute.



Examples of drivers for each of the STEEP categories. These examples provide examples of how to fill in the template, and also provide suggested drivers, in case previous work does not provide any driver for some of the STEEP categories. These drivers of change are linked to some scenarios created for the Latin America region by 'the Millennium Project' in 2010.

Driver	Detail of driver and the different states it could take
i. a change in human population size	<p>Future human populations are unpredictable but can strongly affect how societies operate and use of natural resources.</p> <p>E.g., populations could (i) increase by 20% or (ii) population stays the same</p>
ii. a change in technological capacity, affecting costs and energy requirements of natural resource use	<p>Technological change could affect the efficiency (in terms of costs and energy requirements) by which natural resources can be used, whether for local use or sale.</p> <p>E.g., (state i) advances in technology could halve the cost of producing goods that can be used or sold. Or (state ii) problems with technology could leave costs similar to now (or even more costly).</p>
iii. climate change	<p>It is well known that climate variability and change may produce big effects on natural systems. However, exactly how climate change is uncertain.</p> <p>E.g., (state i) temperatures could increase only slightly and rainfall patterns could remain similar to now, or (state ii) temperatures could increase 2° and the frequency of extreme events will double.</p>
iv. changes in GDP	<p>GDP is often thought to be an important influence on how people live, affecting their choices and opportunities.</p> <p>E.g., regional (Latin America) GDP could (state i) increase by 10% or (state ii) decrease by 10% leading to poorer development outcome. (alternatively the Human Development Index (HDI) can be used instead</p>
v. corruption	<p>Corruption can influence ability to implement any time of plan.</p> <p>E.g., future levels of corruption in the region (Latin America) could range from (state i) widespread and endemic to (state ii) very rare and unusual.</p>



Some scenario-planning processes give stakeholders the freedom to identify, discuss and select which drivers to focus on. However, these processes generally do not allow much or any time to discuss response options. Therefore in COMET-LA, each case-study team led identification of the drivers, in order to ensure stakeholders have time to discuss response options and implications for the future systems.





**b. Record how drivers will affect system variables – ‘morphological analysis’ – by the team**

To stimulate a thorough consideration of how each driver can affect the system, take the internal variables previously used in MICMAC, and systematically consider how stakeholders think these variables may be affected by each driver. This is structured by using a technique called “morphological analysis”. This is one of the techniques proposed by Michel Godet.

Carrying out this step depends on the previous use of Godet’s MICMAC tool to explore how variables in the socio-ecological system relate to each other: in COMET-LA this had carried out in the preceding year. For more information about MICMAC please see *Godet, M., J. F. Coates, and C. Degenhardt 1994. From anticipation to action: a handbook of strategic prospective. UNESCO Publishing, 283pp.* Some information and the free software tool which supports this analysis is available from <http://en.lapropective.fr/methods-of-prospective/softwares/59-micmac.html> However, if you do not wish to use MICMAC, you could instead simply discuss with the stakeholders which aspects of their system they consider to be most influential and important for further study, and use these as the ‘internal variables’ referred to below.

Morphological analysis means systematically considering what will happen to each variable, if a driver takes a particular state (for example, “What will happen to tourism if population declines 20%?” “What will happen if population grows 20%?”). This is carried out using a matrix of each driver state, versus each variable. For example:

	Driver 1 State X	Driver 1 State Y	Driver 2 State X	Driver 2 State Y
	Slight change in climatic conditions...	Drastic change in climatic conditions...	World population increases by 20%	World population remains stable
<b>Variable A: Political stability</b>	Political stability stays the same as now	Political system becomes very unstable	Political system becomes very unstable	Political stability stays the same as now
<b>Variable B: Livelihoods</b>	Local livelihood options and viability stay the same as now	Some livelihoods become unviable,	Fewer jobs available/ earnings decline	Some livelihoods are slightly threatened
<b>Variable C: Sanitary conditions</b>	Stays the same as now	Sanitary conditions decline	Sanitary conditions worsen dramatically	Stays the same as now
<b>Variable D: Forest status</b>	Slight deterioration in forest status	Drastic change on the type of species	Severe deforestation	Stays the same as now

- i. The first task is to select a subset of the internal variables previously used in MICMAC, in order to make feasible the construction and filling of the matrix. Each team should identify 10 internal variables to use in morphological analysis.

These will be selected according to those that were identified by MICMAC as highly influential and dependent (according to the matrix of indirect relations). Since the above criteria might leave behind some variables that while not being highly influential and dependant are still strategic, a team may also choose additional variables to include in the analysis.



Filling in matrixes can be laborious! This is why a subset of variables is used, and it also why we suggest facilitating teams may not wish to carry this out with community. If you are concerned about excluding variables, remember that any excluded variables can be reintroduced later in scenario-planning, when creating narratives in stage 2.

- ii. Next construct the matrix by placing the drivers across the topic (remember to use both states of each driver), and the 10 internal variables in rows down the side. So, external variables (drivers) go along the top, internal variables from the system go along the side.
- iii. Fill in the matrix by asking how each driver state is likely to affect each variable. Use insights from information already collected in the project (i.e. stakeholder views about these relationships).

Whilst filling in the matrix, please keep a record of discussion to explain how the matrix was filled in (e.g. why tourism was thought unaffected by a growing population) and any challenges encountered.



If you want more information and background about morphological analysis it is useful to read *Ritchey, T. (1998), Fritz Zwicky, Morphologie and Policy Analysis, Futures and Options Association (FOA)* available from [www.foi.se/ma/morphology.pdf](http://www.foi.se/ma/morphology.pdf).



It could be possible to construct similar matrices based on existing scientific data about system functioning and/or model outputs. Using these sources of data may – or may not – produce very different results from matrices based on stakeholder perceptions. Comparing the stakeholder-led and scientist-led matrices could provide a really interesting insight into the results of using different forms of knowledge. However for a stakeholder-led process, even if this is carried out, the stakeholders must be given the choice of deciding if and how they may use this information to supplement their own work.

### c. Validate the morphological matrix – *with the community*

After filling in the matrix, it is important that community members have a chance to understand, validate or amend this. There may also be gaps in the matrix that the community can help to fill. Therefore it will be important to present the matrix to community members for their feedback.



You may wish to hold a separate workshop to discuss and help fill in the matrix or combine this with discussions on other topics/stages in the process.

#### Outputs of stage 1:

- A list of the 5 drivers of change (external forces) to be used in the morphological analysis, including descriptions of two contrasting states for each driver (structured by the JHI template).
- A note on which 10 internal variables from MICMAC were used for the exercise and an explanation of how they were chosen.
- A matrix of how changes in each driver will affect the 10 selected system variables. This matrix is called “the morphological space”.
- Notes accompanying the matrix, to explain the reasoning why drivers were thought to have these effects; and how and why the matrix was amended when discussed with the stakeholders.



## Stage 2: Construct alternative futures guided by archetypes

The aim of this step is to use the output of stage 1 to create 3-6 alternative scenarios, whose detail will be described in written narratives. For logistical reasons the narratives will first be created by the teams and will then be confirmed/amended through stakeholder consultation.

### a. Navigate the ‘morphological space’, guided by archetypes – *by the team*

The morphological space produced by stage 1 (the matrix of internal variables and drivers) provides a wide spectrum of things that might happen in the future (tourism might decrease or stay the same; migration might increase or decrease; fish population might decline slowly or might decline very rapidly, etc.). The combination of all those possible states creates multiple potential futures (e.g. a future in which there will be few tourists, increased migration and very few fishes; or a future with very few tourists, decreased migration and very few fishes).

The aim of this step is select combinations of these variable states, to use as the basis of future scenarios. However, this is potentially a very challenging task! The combinations are multiple and potentially very numerous. Furthermore, not all combinations are plausible.

Therefore, this task uses ‘archetypes’ to guide the combination of variables from the morphological space. A literature on scenario archetypes asserts that when considering the future for any local case, there are 6 ‘archetypes’ (broad outlines of scenarios) that can be relevant in any situation. These 6 archetypes are listed below:

World views→	Conventional worlds		Great Transitions		Barbarization	
Archetype name:	Market forces	Policy reform	New sustainability paradigm	Eco-communalism	Fortress-world	Breakdown
Brief description	Market optimism remains dominant and proves well-founded. Market driven globalization, trade liberalization, institutional modernization. Deregulation drives growth	Unprecedented political will to meet social and environmental sustainability goals. Emergence of massive government lead effort to achieve sustainability	New human globalization (rather than localism) changes the character of urban industrial society. Values-led change (versus government-led in the policy reform variant) change catalysed by crisis.	Patch-work of semi-isolated and self-reliant communities. Quite sustainable with high equity, low economic growth and populations. Highly localist vision and face-to-face democracy. Strong decentralization	Authoritarian rule, elites in fortress and poverty outside. Strategic resources are under military control. Conventional governance systems are eroded and alliances of privileged are formed	Vicious circle of chaos, conflict and desperation. Security apparatus cannot contain the violence. Collapse of civil order becomes widespread

Archetypes are simply a guide to help the teams navigate the ‘morphological space’. Using these archetypes is intended to encourage a contrast between different scenarios (rather than resulting in, say 3 very similar scenarios, or just a ‘best case’ and ‘worst case’ scenario). Because there are potentially many combinations, this work is done by the teams and not by the stakeholders. Teams should use the archetypes to guide the navigation of the morphological space, in order to create at least 3 and up to 6 plausible futures for their local case study system.

- i. The description of the archetypes above is just a summary. To fully understand the archetypes, facilitating teams should definitely read *Hunt et al. (2012). Scenarios Archetypes: converging rather than diverging themes. Sustainability, 4, 740-772* available from [www.mdpi.com/2071-1050/4/4/740/pdf](http://www.mdpi.com/2071-1050/4/4/740/pdf)



Note that these 3 world views might be seen as similar to three more common types of scenarios: business as usual, positive and negative. However, Hunt argues that the archetypes have the advantage of not implying any kind of evaluation or normative judgment (i.e. what is positive for somebody can be negative for somebody else).

- ii. Create 3-6 scenarios by using the archetypes to guide navigation of the 'morphological space'.



It is possible that you may find one or more archetypes challenging to apply. In this case, please note this and leave the archetype out. However, please create at least 3 scenarios, corresponding with each of the 3 world views in the above table (Conventional worlds, Great transitions and Barbarization).

The example below is an illustration of how a morphological space could be navigated, to combine variables in line with the 'Barbarisation' world view: 'Fortress World' archetype. This example shows that probably there is more than one combination possible that fits with each archetype (for example the second arrow could have gone diagonally to the left rather than straight down.) Nor can every combination of variables will be used in completing this exercise. Do not worry. It is not possible to explore every possible future. The aim of this exercise is to use the archetypes to inspire a range of contrasting possible futures.

	Driver 1 State X	Driver 1 State Y	Driver 2 State X	Driver 2 State Y
	low-end projections for climate change	extreme high-end projects for climate change	Global population grows exponentially	Global population grows slowly
Variable A: political stability	Remains the same	Becomes very instable	Becomes very instable	Remains the same
Variable B: livelihoods	Remains the same	Becomes seriously compromised	Becomes seriously compromised	Becomes slightly compromised
Variable C: Sanitary conditions	Remains the same	Becomes compromised	Becomes seriously compromised	Remains the same
Variable D: forest status	Slight decline in current forest status	Dramatic shift in tree species occur	Strong deforestation	Remains the same

**Barbarization Scenario:  
Fortress World**

## b. Create narratives– *by the team*

Once the combination of variables and states to fit into the archetypes has been selected, a narrative needs to be created. This is simply a written description of the future scenario that encompasses and describes the future states of the drivers, variables and their connections. It may also include other issues.

- i. Write a narrative that summarises and explains each future scenario. The narrative should incorporate and connect the variables in the morphological analysis. It should also incorporate a description of other aspects of the system: i.e. system variables not used in the morphological analysis should be incorporated here.
- ii. The labels of the archetypes (e.g. 'Barbarization') are for the use of the project team only. It is always very useful to give labels to the scenarios when working with the community, as it helps communication. However, you do not need to use the same labels, it would be better to use locally adapted labels.



You may wish to think of some ideas for labels but when meeting with stakeholders in the next step, ask them for their choice. A discussion on this can help to check shared understanding whilst also resulting in a 'catchy' name!

The following example of a narrative relates to the simple example matrix above. Yours will be longer, because your morphological space will be larger.

### **Scenario name: Crowded jungle**

*"A possible future is one in which there will be extreme climatic changes, following the extreme-high end of the current projections. Extreme weather events will become more frequent and stronger, southern regions will become drier and hotter and sea level will rise very dramatically. Problems coping with climate change will lead to political instability around the world. Political instability at the national level will transfer to the local level, affecting the local community, and affect planning for natural resource management. This will cause local management actions to be disorganized and monitoring to falter, compromising the capacity of the community to sustainably use the resources and seriously compromising livelihoods. At the same time, since the world population is growing rapidly, this is reflected in the local community (since there will be less emigration and the population of the community will grow). This will create great sanitation problems, because there will not be enough infrastructures and sanitary conditions will deteriorate (also because the hotter and drier climate will create water scarcity). Because of the world and community population growth, external and local pressures on the forest will increase, and over-exploitation will take place leading to deforestation. Only the few privileged ones that have managed to emigrate will have a good life and the rest of the community will be in poverty".*

### c. Confirm and finalise the narratives – *with the community*

Once the narratives have been created by the teams, these need to be presented to the community for their feedback.

- i. Describe the process by narratives were created, and present each narrative (3-6) to the community.



It will probably be helpful to prepare visual material to represent the narratives to the stakeholders. The written text might be useful in some contexts, but not in others. You may want to use posters or sticky notes with quotes. Photos or drawings can be very useful to illustrate key features of the narratives. You can also have posters in the wall with the different combinations of variables and states that you have selected.

- ii. Ask the stakeholders if they find these narratives understandable and plausible. If they don't, could amendments to the narratives make them become more realistic? Or do some narratives need to be rejected or replaced?



The futures need to be plausible, but this does not mean "probable". Scenarios need to also include unexpected and low probability futures, so facilitation needs to be oriented to "open-minds" about what plausibility can mean. If necessary remind people of radical changes that have happened in the past, and the reason why it useful to think about change.



This would be a good moment to ask the communities to give labels to each of the scenarios. If you have already labelled them, ask them if they would like to change the names.

- iii. As a result of the discussions with stakeholders new confirmed narratives will be agreed. Therefore, the teams may need to amend the narratives created in the previous step.



The use of the morphological space to create the narratives is just a tool and it should not dominate the process. This step is about confirming/amending the *narratives* themselves. If the community wishes to change the narratives, do not go back to the morphological analysis, just focus on creating contrasting the future scenarios that they can accept as possible.



After carrying out the common methodology, it may be interesting to compare the narratives with the original systems and relationships described in MICMAC. Are there logical inconsistencies, or do they match? We might speculate (and hope) that referring to the same set of variables in stage 1 will help to keep the systems descriptions consistent. However, it is possible that when describing the future people have a different idea about how their system operates, or that they think additional variables will become important. Or it possible that people's ideas are simply inconsistent! It is interesting to note as an avenue for further exploration, and it may help us to understand to what extent codifying system properties in MICMAC helps to inform later work. However, if you do this and discover any inconsistencies, do not try to resolve them before progressing: in stage 3 simply use the scenarios developed



in stage 2. Trying to resolve and explain any inconsistencies could eat up a lot of time and leave less time to discuss responses.



If a team has a process-based model of aspects of system functioning this could also be used in a similar way, to explore consistency with future descriptions.

### **Outputs of stage 2:**

- A matrix with bubbles and arrows combining the different variables and states, reflecting the 3-6 scenario archetypes. If any scenario archetype cannot be applied, note why.
- Narratives created by the team for each of the archetypes (including photos or drawing if used in the confirmation process).
- Confirmed/amended final narratives, the names used to label these final narratives, and accompanying notes (e.g. noting if they think some narratives are more plausible, if and why some proposed narratives were rejected or amended).

### Stage 3: Identify response options

The aim of this stage is to focus on action: what people can do, that may help them to address problems /achieve their goals in the context of future change? This stage uses the outputs from stage 2 to help identify useful responses. We do not want to just to talk about the future and stop there!

#### a. Review existing actions, and describe existing local governance system – *by the team*

Before the meeting the team should review existing activities (e.g. current plans, procedures etc.) that might be relevant to supporting future sustainable management. Incorporating and connecting these within a description of the local governance system will be helpful for carrying out stage 4 (where implications for future governance will be discussed).

It will be useful summarise the existing governance system and to bring a checklist of existing activities to the meeting with stakeholders in the next step, since future response options can include existing actions: e.g. an existing committee or monitoring strategy may be even more useful in future.

#### b. Identify possible response options – *with the community*

This step aims to capture ideas about actions or ‘response options’ that can help to meet future goals. This step simply searches for useful ideas: the subsequent steps c and d then focus on considering whether these ideas will be “robust” within different future scenarios.

The exercise begins by reviewing the future scenarios produced in stage 2, and by reminding people of their goal for managing the system in the face of this change. Considering these goals, and these future scenarios, the stakeholders should be asked to “brainstorm” any possible actions or responses that they believe might help to tackle problems and achieve goals in the face of future changes.

- i. Remind stakeholders of the influential variables as determined by the MICMAC exercise. Because these variables are influential, asking what can alter these variables should be a good way of affecting other parts of the system.
- ii. Ask stakeholders to “brainstorm” useful options or actions (probably in sub-groups). What response options might help them achieve their goals?



To ensure that there is wide spread in the type of response options considered, considering using these “7 P’s” as a guide:

- *Policies* e.g. rules and regulations;
- *Programmes* e.g. to build infrastructure;
- *Plans* e.g. resource management plans;
- *Procedures* e.g. instructions for best practice in resource harvesting or use
- *Processes* e.g. monitoring systems;
- *Products* e.g. information, or technology;
- *People* e.g. training to build skills, capacities, or to influence attitudes & motivation.

For example, in Mexico, could introducing a new procedure influence “economic activities with forestry and agriculture” in way that will reduce emigration?



Do not automatically discard unusual, “whacky” or “crazy” ideas. Some crazy ideas can actually be very good!





We suggest that the stakeholders are asked to first focus on local-level actions, and then on actions that could be carried out by actors external to the local system (e.g. national-level policy-makers). Alternatively, one sub-group could look at local responses whilst another looks at external responses, working in parallel.

- iii. Check if ideas discussed by stakeholders include options that are already existing or planned. If not, should anything be added?



In order to encourage 'out of the box' thinking, it may be best to start by focusing on new ideas for response options (perhaps use examples from other places to encourage free thought) before later reminding participants of existing actions and options that may also be relevant in the future.

- iv. Collect all the ideas, and ask for them to be explained in plenary. At this time, some options might be discarded as being highly implausible and/or unlikely to act as predicted!



If hundreds of options are collected by the end of this task, it will be impossible to discuss them all in great detail! If at the end of this task there are many options, a subset of these must be shortlisted: we suggest 25 options which are most popular across all participants.



If the community has already generated a detailed vision or mission statement, then this exercise should begin by comparing this vision to the future scenarios derived from stage 2. The driving question is then "what actions can we use to move from the scenarios to the vision?". If the previous work had generated different visions by different sub-groups, sub-groups for each vision may need to work separately on this task, and then come together to see if there are response options in common.

**c. Consider how 'robust' these responses are to future change – *with the community***

Some options may be relatively useful regardless of what the future holds. These types of responses are called 'robust'. For example, "investing in education" is often thought to be an action that will be useful regardless of what the future holds. When choosing to implement future response options, it is good to select options that are robust.

To do this, we will ask the stakeholders to quickly but systematically consider the utility of each response options given each scenario. Simple scoring can be used to indicate if an option is thought to be useful in each scenario (see example on the next page).



Before meeting with stakeholders it will be useful to prepare a table showing each of the scenarios along the top. The response options can then be listed down the side.



Once the table is created, scoring (of usefulness) can be easily indicated using ticks or other symbols. In our example we use smiley faces! Exactly how scoring is carried out, and the degree detail in scores (e.g. simply yes/no – or something more detailed like a ranking?) is best judged by the facilitation team

An example of a table allowing stakeholders to score the usefulness of each option under each scenario.

	Scenario 1	Scenario 2	Scenario 3	Scenario 4
<b>Response option 1</b> e.g. Build a Dam	😊😊	?		😊
<b>Response option 2</b> e.g. educate about safe harvest levels		😊😊	😊	
<b>Response option 3</b> e.g. Improve school	😊	😊	😊	😊
<b>Response option 4</b> e.g. Invest in alternative livelihoods		😊		😊
<b>Response option 5</b> ....	😊		😊😊	

As a result of this exercise, robust response options can be identified. Although many ideas might have been discussed in step a, relatively few might be robust. For example, in this case, only response option 3 is robust (useful in all scenarios).

If there are no or very few robust options, look for robust strategies. A robust strategy can be formed by combining different options that are each useful in different scenarios. For example, in this case, implementing options 1 and 2 together could make a robust strategy (or options 4 and 5).

**d. Discuss how future shocks might affect the options – by the team and then with stakeholders**

This task extends the idea of checking the robustness of different options, by introducing the idea of ‘shocks’. Shocks are very unlikely but very influential events that can radically disrupt systems. They are usually negative although they can be positive. Considering shocks can help to inform and refine ideas of what responses are ‘robust’.

- i. Elaborate on what shocks will be used in each case. Try to use two shocks: (1) natural disaster, and (2) human-caused event.

- (1) A natural disaster. For COMET-LA it was suggested that all cases should try to use a “tropical storm”. Of course, this will take different forms and have different consequences in each case. (For example, in Colombia, it could lead to landslide or a tsunami, while in Mexico the storm could cause a massive forest fire.)

- (2) A human-made disaster (anthropomorphic cause). For COMET-LA, it was suggested that each case should identify their own disaster. For example, this could be an explosion or a massive toxic/chemical spill in the harbour. Other ideas include a massive collapse in the global financial system, or a drastic change in environmental/ land-tenure laws.

Before meeting stakeholders to discuss shocks, the team should have prepared a short description of each shock event (i.e. one paragraph).

- ii. Ask the community to reflect and discuss whether the options would still be effective if the shock event occurs. This discussion can be open: the aim is simply to encourage further reflection as to how future change might affect the system, and affect future response options.



As a result of this discussion, certain response options may – or may not - be reconsidered or reprioritised.



The topic of shocks may need to be introduced carefully, to avoid being seen as either scaremongering or utterly unrealistic and irrelevant. It is also important to avoid describing a shock as being so terrible that is likely only to introduce a fatalistic response (i.e. a complete annihilation of the study site due to an asteroid strike).

### **Outputs of stage 3:**

- A description of the local governance system (incorporating the current formal and informal activities undertaken to manage the resource/resolve a problem, and a description of what actors at different levels are involved in these activities) and, appended, a list of existing plans or actions that could also be useful in future.
- A list of possible response options identified by the community, with sufficient explanation to allow each response option to be understandable to those not present at the meeting. The list should be split into two parts: the first lists response options that could be carried out by people within the local system, whilst the second lists responses that could be carried out by actors external to the system.
- A table showing which response option is considered suitable under each scenario, with notes to explain this.
- A description of the 2 shocks used, and notes on a discussion as to how shocks were thought to affect the response options.
- The results of the above activities should be synthesised to produce a list of robust response options (and/or robust response strategies). This list may be obvious and made explicit from the workshop discussions, or may require synthesis by the team.

## Stage 4: Discuss implications of the response options for local plans

The aim of this stage is to confirm the list of robust response options, and identify the implications for planning future strategies that will support local communities in adaptive management of their socio-ecological systems. Please note that this phase mainly focuses on implications for the local governance system, which the community can control, but it is likely that many implications for external stakeholders will also be identified.

### a. Explore the implications of robust response options – *with the community*

The aim of this step is to discuss the implications of robust response options that have been identified in stage 3. It is important that response options are first identified and considered in terms of their usefulness in reaching local goals, but other implications need to be considered in order to understand how feasible and suitable an option is for future planning.

For each of the 'robust' response options, participants should then be asked three sets of questions which relate to the three aspects of sustainable development (social, economic and environmental). (The topics of these questions inevitably overlap.)

- i. Questions about social implications and acceptability:  
Who is responsible? Who will be affected? Will this response option promote equity in the community?
- ii. Questions about economic implications:  
What will the option cost? Who would bear the cost? Who would benefit? Is the option flexible or reversible?
- iii. Questions about environmental implications:  
Will this option entail any adverse environmental impacts, within the local system or beyond? Will it help to conserve or restore any natural features, within the local system or beyond?



In reality, it may not be possible to entirely separate identification of response options (stage 3) from the discussion of their implications (stage 4). Thus, teams may decide to connect the facilitation these stages. However, it is important to remember that response options should first be identified in terms of their usefulness for reaching future goals, *before* giving attention to other implications (like cost). It may be that it will be most useful to invest in one expensive but useful option (i.e. a dam!) rather than investing in five cheap but less useful options.



It may be appropriate to create sub-groups to discuss the implications of different response options, especially if different sub-groups have very different visions/goals.

### b. Identify implications for future local plans – *with the community*

For local people, it is important that this work will be able to help them to think about their future plans, and implications for their local governance system. Therefore, discussions about robust response options and strategies should be used to inform ideas of how to manage the local system in the future.

In this step we provide some suggested questions to help guide the discussion and inform planning. As a result of the answers generated from these discussions, some options may be considered more or less acceptable or more or less suitable at different times. It should also become clearer as to how

they might connect with or be supported existing processes and plans within the community. However, we recognise that the details of how these ideas are used will depend on existing community processes, and be controlled by the stakeholders. Any plans made should take whatever form the stakeholders find useful.

- i. What response options would stakeholders like to consider implementing in the future? Do different groups have different views?



Where possible, it is important that the views of different groups are shared in order to inform community planning processes.

- ii. How will the option be encouraged (i.e. via influencing Incentives, Information, Rules, or Social norms?) Would this require cooperation with non-local stakeholders?
- iii. Are there existing plans, strategies or processes that can adapt or incorporate these ideas for response options? Or are new plans and processes needed? When should these response options start to be implemented?



Any new plans can, optionally, include establishing monitoring i) to help track what future change is occurring, and ii) if planned actions are being taken. In conjunction with monitoring it is usually helpful to establish when a plan will reviewed and updated. Therefore, if specific plans are being discussed, it could be useful to incorporate a discussion on monitoring.



It could be interesting and useful to carry out this work separately with external stakeholders, focusing on the non-local response options.

#### **c. Summarise implications for local governance – *by the team with/without the community***

As a result of all the discussions during the scenario-planning work, it should be possible to conclude this work by identifying summary implications for this governance system. Teams may already have a description of the existing local governance system (in COMET-LA this arose from work on the first years of the project and summarised at the start of stage 3). If they do not, the team should record a brief summary of the existing governance system.

- i. Overall, does this work highlight any implications for the existing local governance system?
- ii. Is it possible to identify recommendations to improve the resilience of future governance?



It could be possible to add more detail and structure to this task by explicitly relating future response options back to the Ostrom framework.

#### **Outputs of stage 4:**

- A report confirming the list of robust response options or strategies, and discussing the implications of adopting these options.
- A plan identifying what the local community intend to do to support adaptive management of their socio-ecological system; and where they need the input of other, non-local, actors.
- A summary report on how the local governance system may have to adapt to respond to future changes.



## Outputs from this process

The process of discussing these issues should help bring people together; to think about what they desire, to understand other people's points of views, and to refine ideas that will aid future adaptive management and support more resilient local governance systems. This is the most important output of the process, therefore it is important that copies of any tangible outputs are made available to communities, as a record and reminder of this process. The expected tangible outputs of this process are listed at the end of each stage in this document.

The outputs created by the three cases working in the COMET-LA project will be available in the form of deliverables on the COMET-LA website. Visit <http://www.comet-la.eu/index.php/en/publications.html> and look for deliverables 2.3, 3.3 and 4.3 for a description of the outputs at each case study site. These deliverables are available from September 2014. In addition, deliverable 5.1 (available in November 2014) summarises and compares these experiences, whilst deliverable 1.3 (available from January 2015) discusses the methodological learning arising from this process. In time we also hope to develop one or more academic papers based on the COMET-LA experiences: if you would like to know more about these or any other aspect of this work, please contact the authors of this report at [cometla\\_jhi@hutton.ac.uk](mailto:cometla_jhi@hutton.ac.uk)



## Glossary

Archetypes	In the context of scenario building, archetypes are pre-established and contrasting scenario variants. Each variant corresponds to a plausible state of the world.
Drivers of change	A key external force acting with a significant influence on systems and management outcomes. Examples include climate change or globalisation.
Morphological analysis	This is a technique used by Godet (as part of PSA). Morphological analysis means systematically considering what will happen to each variable, if each of the drivers takes a particular state. This is carried out by filling in a matrix of each driver state versus each variable.
Morphological space	The matrix arising from carrying out morphological analysis. It should show the consequence of each driver state acting on each variable.
Narratives	A written description of a scenario, highlighting the main scenario characteristics and dynamics, including the effects of key drivers on the system.
Response options	Actions that can be taken to help sustain the system and tackle problems, regardless of future changes. (These actions may or may not include existing actions.)  Processes focused on climate change use the label “adaptation and mitigation options”.
Robustness	A robust response option is one that performs well over a very wide range of alternative futures. In addition, if different response options are useful in different scenarios, these could be combined to form a ‘robust strategy’.
Scenarios	A coherent, internally consistent, and plausible description of a possible future state (including both social and natural aspects).  A scenario is not a forecast; rather, each scenario is one alternative image of how the future can unfold.
Shocks	Very low probability, but very high impact event that were it to occur would severely impact the human condition.
State	We do not know what state each driver of change will take in future. For example, we may think changes in human population size will have an important effects, but we do not know if the population will decline or will grow. Therefore two or more states must be pre-defined for each driver that is used in morphological analysis.
Storyline	A storyline is very similar to a narrative: it focuses on explaining how a scenario came to be.
Strategy	If different response options are each useful in different scenarios, they can be combined to form a ‘robust strategy’.
Vision	A description of a desired future system. Although the vision must be still be plausible, it reflects people’s desires, hopes and goals.  Visions typically arise from ‘normative’ approaches to scenario generation. This differs from the approach used in these instructions, which focuses on the ‘exploratory’ approach.