Multi-scale participatory local scenario development: Using Mediterranean scenarios as boundary conditions

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Abstract
This paper deals with the development of multi-scale, participatory, qualitative scenarios, as were developed within a larger EC-financed project, MedAction. The main objective is to assess the (dis)advantages of using higher-level (Mediterranean) scenarios as boundary conditions during scenario development workshops in Spain, Italy, and Portugal. Three European scenarios were developed, by adapting three existing scenarios. Those were subsequently downscaled to the Mediterranean level, which served as an input in a series of one-day workshops. Local scenarios consisted of two parts, a collage of images portraying the situation in 2030 and an accompanying storyline. The three different Mediterranean scenarios were received similarly in the three local areas. *Big is Beautiful* was generally perceived as being (too) extreme; *Convulsive Change* was accepted almost without questioning and could therefore be considered not extreme enough; *Knowledge is King* exemplified the middle-ground of a scenario that is sufficiently surprising, yet close enough to present reality. Besides the type of scenarios that are presented to the stakeholders, it is also essential to consider how much information should be provided to the stakeholders beforehand, as they are likely to repeat part of what was presented to them. Using higher-level scenarios as boundary conditions during lower-level scenario workshops has important advantages *and* disadvantages. Therefore, we like to advocate the use of several methods to be able to check for inconsistencies, thus indicating the need for a scenario development toolkit in Integrated Assessment.

Key words: Scenario, Multi-scale, Scenario Workshop, Stakeholder Participation, Integrated Assessment, Narrative Storylines

1. Introduction

Scenarios in the broadest sense, i.e. "hypothetical sequences of future events" (Kahn and Wiener, 1967), have been developed since the 1940s. Since, a multiplicity of different types of scenario analysis have developed, including for example technological forecasting (e.g. Martino, 2003); backcasting (e.g. Dreborg, 1996); or scenario planning (Peterson et al. 2003). Besides, scenarios can be qualitative or quantitative (Van Notten et al., 2003); have as a goal scientific inquiry or real world planning (Xiang and Clarke, 2002). Heugens and Van Oosterhout (2001) and Van Notten et al. (2003) provide good recent overviews and attempts to classification.

Following the typology of Van Notten et al (2003), this paper deals with the development of scenarios that address *multiple temporal and spatial scales*; are *qualitative* rather than quantitative; involve *stakeholders* throughout the process; and have a high level of *integration*. These types of scenarios, that help identifying and explore a range of possible futures (Rotmans and Dowlatabadi, 1998), have a number of important advantages. By involving stakeholders, expert knowledge can be provided and relevant decision-makers can be involved directly. Qualitative storylines can be communicated easily to non-experts and enable the construction of highly complex, integrated scenarios. By developing scenarios at multiple spatial and temporal scales, fast processes that act over short distances can be linked to slow, large-scale, processes.

1.1 Integrated Assessment and the Millennium Ecosystem Assessment

The methods in this paper are rooted in approaches as are being developed within the Integrated Assessment community. Similarly important however is the recent Millennium Ecosystem Assessment endeavour, which could be considered an IA-approach in many ways. Integrated Assessment (IA) is a rapidly growing field of research (Van der Sluijs, 1997; Rotmans et al., 2000; Tansey et al. 2002) and can be defined as the interdisciplinary process of combining, interpreting, and communicating knowledge from various scientific disciplines such that a problem can be evaluated from a synoptic perspective (Rotmans and Dowlatabadi, 1998). The Millennium Ecosystem Assessment (MA) is a four-year international work program designed to meet the needs of decision-makers for scientific information on the links between ecosystem change and human well-being (MA Board, 2003). Both IA and MA stress the need to be multidisciplinary, to conduct the research at multiple scales, and to involve stakeholders and end-users throughout the assessment. And more importantly, both advocate the use of (multi-scale) scenarios as one of the cornerstones of an assessment. For example, within MA, four global scenarios are being developed and around 30 approved and associated subglobal assessments are underway that all develop regional and/or local scenarios.

1.2 Origin of scenarios

Multi-scale scenario development was carried out as part of a larger EC-financed project (MedAction), employing methods as developed during an earlier EC-financed project (VISIONS; see Rotmans et al., 2000; Rotmans et al., 2001). Both projects were coordinated at the International Centre for Integrative Studies (ICIS), a lead institute on Integrated Assessment.

The original European scenarios

The base for the European scenarios that are presented in this paper was laid during the VISIONS project (1998-2001). It was an endeavour to envision the future of Europe through a collective effort involving scientists, decision-makers and stakeholders from a variety of sectors. The VISIONS partners working with these groups developed descriptions and analyses of imaginable courses of events by way of European scenarios (2000-2050), regional scenarios and integrated ‘visions’ of European and regional developments. Thus, scenarios were developed independently and linked afterwards.

Mediterranean and local scenarios
The development of European and Mediterranean scenarios was part the MedAction project (2001-2004). Within this project, an information and decision-support base on land degradation is being developed to assist decision-makers in the formal and informal decision and policy making process to combat desertification in the Northern Mediterranean Region. The specific problems of desertification and mitigation measures are addressed at the European, Mediterranean and local scale. Land use change scenarios are developed at the European, Mediterranean, and local scale. Scenarios were developed at European and Mediterranean scale, and for four local case studies in Portugal, Spain, Italy, and Greece (see Figure 1). Local scenarios were developed during a series of stakeholder workshops in each of the local areas, tested various different approaches to local scenario development.

1.3 Linking multi-scale scenarios
A specific objective of the multi-scale scenario development was the downscaling of Mediterranean scenarios to the local level, and upscaling of the results of a series of stakeholder workshops back to the Mediterranean level. During a Millennium Ecosystem Assessment meeting in Stockholm 2003, the scenario working group of MA proposed three distinct approaches to maintain the link with global scenarios when developing local scenarios (pers. comm. Monika Zurek):

1. Use the global storylines as the *boundary conditions* for the local scenarios.
2. Use the global scenario storylines as a *wind tunnel* for testing local development policies for your region.
3. Use a *standard perturbation* and play it through in your area for each of the four storylines.

A fourth option entails a less strict linking, but is perhaps most used, a prime example being the methodology of the VISIONS project (Rotmans et al., 2000):

4. Develop global and local independently and attempt to link afterwards

The focus in this paper is on an analysis of the advantages and disadvantages of the first method. It is the most top-down approach, thus maintaining the consistency between global and subglobal assessment best, but possibly discouraging the incorporation of new or different developments in regional scenarios.

1.4 Objectives
This paper focuses on the development of Mediterranean scenarios and on the resulting local scenarios of a first series of stakeholder workshops that were held in October/November 2002 in Portugal, Spain, and Italy. During those workshops, stakeholders were asked to use Mediterranean developments as boundary conditions. The main objective of this paper is to explain the main methodology, summarise the results and analyse the success of this method in developing bottom-up scenarios, while maintaining a top-down link.

2. Methods

2.1 The Northern Mediterranean region
As in most other semi-arid regions, desertification in the Northern Mediterranean region (including Portugal, Spain, Italy, and Greece) is largely a society-driven

problem, which can be effectively managed only through a thorough understanding of the principal ecological, socio-cultural, and economic driving forces associated with land use and climate change, and their impacts (e.g. Brandt and Thornes, 1997; Oxley and Lemon, 2003). A web of global (globalisation), regional (EU policies; EU enlargement), and local (water distribution) forces with a multitude of feedbacks and interactions influence local stakeholders. Integrated scenarios can play an important role in understanding this complexity and possible future changes.

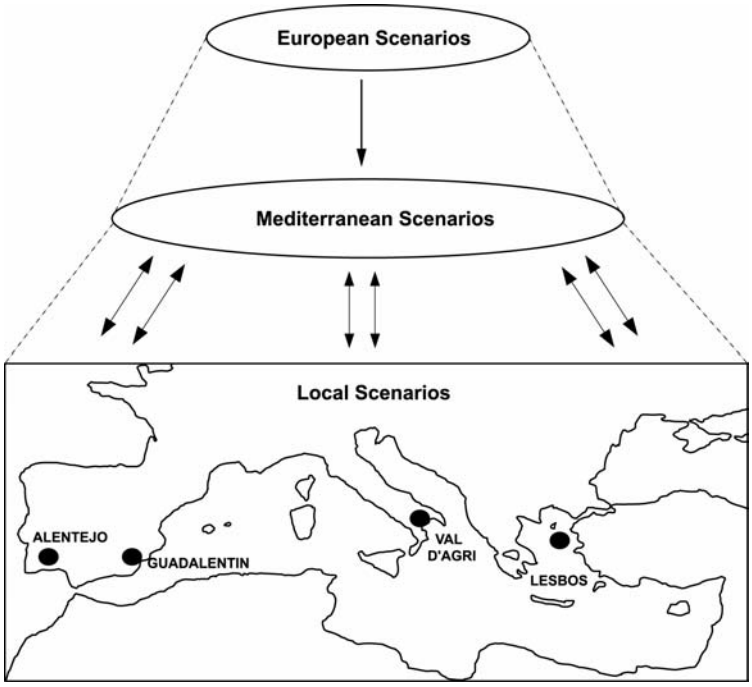

Figure 1. Multi-scale scenario development within MedAction.

Scenarios are developed at three distinct levels (Figure 1). European scenarios are based on three existing scenarios as developed in the VISIONS project. These translate directly into three Mediterranean scenarios. Local scenarios are based on the main assumptions of the Mediterranean scenarios and will be scaled-up, where possible, to the Mediterranean level.

2.2 European and Mediterranean scenario development

Within the VISIONS project, three European scenarios were developed, called *Knowledge is King*, *Convulsive Change*, and *Big is Beautiful?* They were structured around the so-called Factors – Actors – Sectors framework (FAS; see Rotmans et al., 2000; Greeuw et al., 2001). Factors, actors and sectors are a pre-selected number of themes, institutions, and sectors chosen to help focus the scenario development process. The framework guarantees integration over themes and dimensions. The first step in fitting the original scenarios to the Mediterranean issues was the replacement of the four factors, actors, and sectors by those that represent the main issues related to land use and land degradation in the Mediterranean. Because the focus within VISIONS was mainly on urban or urban influenced areas, while MedAction focuses on rural, isolated areas, all factors and sectors needed to be replaced. The most important newly added sectors were agriculture and tourism; among the newly included factors were water availability; land degradation; and migration. Influential actors were businesses and governmental bodies.

The process of changing the original narrative stories to European scenarios that focused on the situation in the south of Europe was as follows: First, information that was considered irrelevant to the situation in the Mediterranean region was deleted. Developments that *indirectly* influenced the Mediterranean region were maintained in the story. For instance, improvements in the transport and infrastructure – sectors in the VISIONS scenarios – have great impact on the accessibility of (parts of) the Mediterranean. The second step was the incorporation of developments in the newly added factors and sectors. These additions were made consistent with the main underlying assumptions of the existing scenarios. Many additions were needed, of which some followed directly from existing developments in the original stories, while others lacked a direct link with the original scenarios and needed to be projected in the spirit of the original scenarios. Finally, the time horizon was shortened from 2050 to 2030, i.e. from two generation to one generation. After discussion with local experts, it was decided that developing local scenarios for more than one generation in the future might prove very difficult for local stakeholders in the primarily rural case study areas. Details of the methodology can be found in Kok et al. (2003a).

Downscaling from the European to the Mediterranean level was relatively straightforward. The most important change was the addition of spatial and thematic detail, using the same set of FAS. Scenarios were enriched with developments for all of the four countries that are considered within MedAction. Besides, general remarks ("migration to the south") were specified ("temporary and later permanent migration to the large cities in the Iberian Peninsula"). In general, the European scenarios illustrate and explain European-scale developments that are important for the Mediterranean region, like the enlargement of the EU, the abolishment of agricultural subsidy systems, or the effects of changes in the ICT sector on North-South migration flows. Subsequently, the Mediterranean scenarios consider these developments as underlying driving forces and illustrate their effects.

It is important to reiterate that the changes in the FAS do not reflect fundamental changes in the underlying scenarios. In MedAction, we are looking at the same European (and Mediterranean) scenarios as in the VISIONS project and with the same names; we are simply casting our gaze upon different parts of the story.

2.3 Local scenario development

Scenario workshops

Many good overviews of (the process of) organising scenario workshops exist (e.g. Street, 1997; Kasemir et al., 2000; Heemskerk, 2003). Mercer (1995) even provides a nine-step "cookbook". The recommended number of scenarios is 3±1 (Xiang and Clarke, 2003; Peterson et al., 2003). Those scenarios should be extreme and contain surprises (Peterson et al., 2003). There seems to be less agreement on the length of a scenario workshop, which is influenced heavily by time and budget constraints. A number of 5-10 participants is generally recommended per scenario group (Van Asselt and Rijkens-Klomp, 2002; Kasemir, 2000), depending also on the variety of stakeholders in a region.

The overall methodology followed these general recommendations:

We developed 3 Mediterranean scenarios, all containing surprises, we organised two one-day workshops with 20-25 stakeholders, to be divided into three scenario groups. The first workshop used a forecasting methodology, developing local scenarios using the Mediterranean scenarios as boundary conditions. The second workshop used a *backcasting* methodology, starting from a desirable end-point reasoning back to the present (see Dreborg, 1996; Robinson, 2003), thus dropping the link between Mediterranean and local scenarios. The methodology of the first workshop was adapted from the ULYSSES project (Dürrenberger, 1997; Kasemir et al., 2000) during a number of in-depth discussions with the participatory working group at ICIS. Details of the methodology of the first series of stakeholder workshops can be found in Kok et al. (2003b).

Methodology first workshop
The first series of one-day stakeholder workshops took place in October (Val d'Agri) and November (Guadalentín and Alentejo) of 2002. The overall aim of the workshop was to develop long-term (2030) future outlooks for their local region, using the Mediterranean scenarios as boundary conditions. In order to understand the perception of the local stakeholders on future developments, however, we needed know the perception of this group of stakeholders on the present situation first. The aim of the morning session was therefore to define a "story of the present", by identifying first the main factors of importance in the region and then clustering them and establishing relationships between those clusters. The aim of the afternoon session was to create three "stories of the future", connected to the three Mediterranean scenarios.

The "story of the present" will not be discussed here. It suffices to say that a broad variety of issues were discussed, including all important FAS as used to develop the Mediterranean scenarios. Although some locally important new factors were introduced, in general discussions in all regions confirmed the selection of FAS.

The afternoon session started with a presentation of the three Mediterranean scenarios (see result section). We aimed at the development of three local scenarios, each one linked to one of the three Mediterranean scenarios. The group of stakeholders was thus divided into three subgroups, each with their own facilitator. We aimed at two distinct products: an end-point and a chain of events. The three groups were asked to make a *collage* of images depicting the future in their region one generation from now (i.e. 2030), and to prepare a 15-minute presentation, explaining focusing on the *storyline*.

3. Results

3.1 Mediterranean scenarios
Three Mediterranean scenarios were developed with the same names as the European scenarios in VISIONS:

1. **Knowledge is King**: What if technological development is such that a mass migration to the Mediterranean is initiated and a European Sunbelt is formed, while water availability is strongly increased?
2. **Big is Beautiful**: What if the 'merger principle' oversteps all limits, creating an oversized EU and powerful multinationals, thus initiating societal degeneration?

3. **Convulsive Change**: What if climate change is as disruptive as some are now predicting, triggering a series of severe droughts and desert formation, and outpacing society's ability to adapt?

The scenarios are 20-30 page stories that recount the main developments in Europe and the Mediterranean. Stories provide information for three separate phases (normally decades) between 2000 and 2030 and are build around the FAS framework, thus focusing on developments in a limited number of sectors and factors, relevant to the situation in the Mediterranean region. For every scenario, a one-page summary has been written. To illustrate what the Mediterranean scenarios encompass, the one-pager of Knowledge is King is given below. For more details, we refer to Kok and Rothman (2003) and Kok et al. (2003a):

Knowledge is King
What if technological development is such that a mass migration to the Mediterranean is initiated and a European Sunbelt is formed?

Phases
2000-2015 "Over our head"
2015-2025 "Incoming!"
2025-2030 "Quiet after the storm"

Main factors
- Rapidly increasing importance of Information and Communication Technology (ICT) sector turns Europe into a knowledge-based economy.
- Many important inventions, the most important being: life-extension drug; cheap water desalination techniques; new drought-tolerant, high-yielding crop varieties; cheaper and faster transport modes.
- A schism in society between the Connected (those making use of new ICTs) and the Unconnected (those unable or unwilling to do so). The inequity in society is not considered an inequality. The Unconnected take up a more back-to-basic approach to life.
- Formation of a European Sunbelt. This eventually stretches from the south of Portugal to the east of Greece.

Agriculture
Initially the sector experiences large problems with increased competition from the east when the EU expands. Later, the position of the entire agricultural sector improves strongly, when the water availability problem is solved. Irrigated agriculture expands.

Tourism
The tourist industry becomes the most important economic sector in the south, benefiting from cheaper transport, increased water availability, and Sunbelt formation.

Civic
All Mediterranean countries struggle with the highly polarized division between Unconnected and Connected. The advantages the ICT bring for the Connected, however, seem to outweigh the associated new problems.

Forestry
Large new national parks are created, not only encompassing forested areas, but also desertified areas in the south. More investments in reforestation programs speed up the expansion of forested areas.

Individual countries
In Spain and Italy, the Connected are likely to be in a strong position, with the Imperio Digitale (the European Silicon Valley) being the symbol of the technological revolution. In Portugal the Unconnected could well become highly organised and powerful under the direction of the NGOs. In Greece, the Connected and Unconnected are in danger of becoming highly polarised, and the latter may enjoy little of the benefits that they have in other countries.

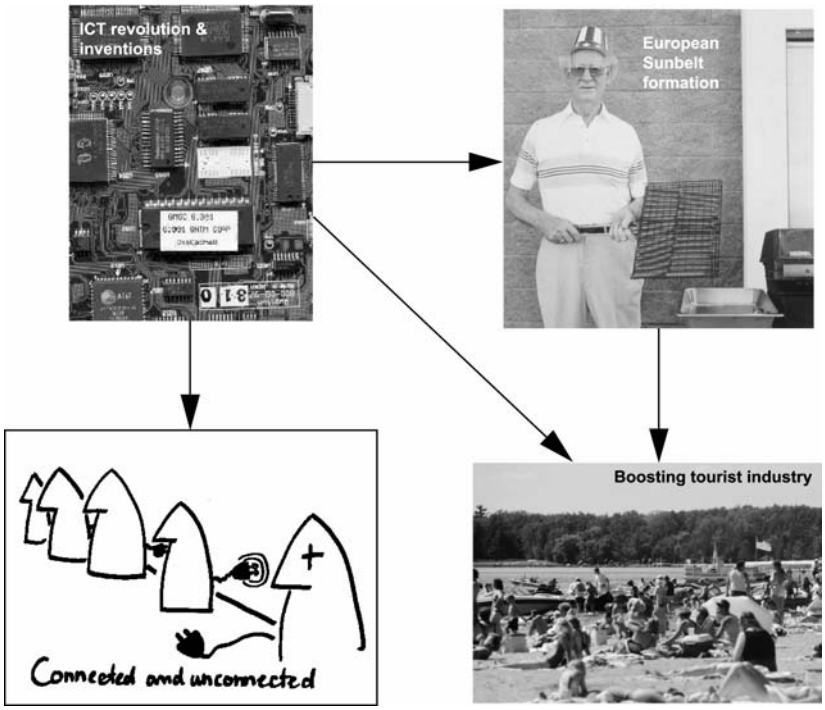

Figure 2. Main developments in Knowledge is King as presented to the stakeholders

3.2 Comparing Mediterranean scenarios
Although the underlying driving forces in Big is Beautiful (BiB) and Convulsive Change (CoC) are very different and although the overall situation also differs, there are many similarities between these two scenarios. Water availability decreases – either due to drought (CoC) or to lack of infrastructure and general chaos (BiB) – which is a blow for agriculture. The generally poor economic outlook triggers outmigration. However, in CoC the society learns how to cope with the devastating effects of climate change, while the civic sector in BiB collapses leaving the future highly uncertain. Knowledge is King (KiK) is in many ways a different scenario: water supply is guaranteed; a European Sunbelt is formed; intensive agriculture blooms like never before; and the economy and society are generally strong and healthy. Although locally disruptive changes have taken place, the entire Mediterranean region is assumed to profit.

For the individual countries it can be concluded that developments in Greece are generally the worst and those in Spain the best, though for very different reasons. In Portugal and Italy, the end picture varies between the scenarios. The specific division at country level for the Mediterranean scenarios serves the purpose to highlight what might happen, not necessarily what is going to happen. That is, developments as they are described for e.g. Spain might largely be valid for, for example, parts of Portugal.

3.3 Local scenarios

For a complete description of all nine collages and storylines, we refer to Kok and Patel (2003).

Collages

Three collages, all linked to one of the three Mediterranean scenarios, were produced in the Guadalentín (Spain), the Val d'Agri (Italy) and the Alentejo (Portugal). Figure 3 shows the collage based on the Knowledge is King scenario in the Guadalentín. Key processes are migration, land speculation, new technologies, and (improving) quality of life, which lead to increased water availability, increase of tourists and golf courses, and a substantially different way of life. All collages contained similarly important information about the groups' ideas on the future, although expressed in various different ways, as shown in Figure 4. One collage resembled a flow-chart illustrating most of the story behind it (upper left); one group dismissed the Mediterranean scenario and constructed its own "The change is aquatic and not climatic" (upper right); one group used a base map of the Guadalentín and created a spatially explicit map of the future (lower right); and one group illustrated their future image by a drawing (lower left).

Figure 3. Collage based on Knowledge is King scenario in the Guadalentín.

Figure 4. Details from various collages from the Guadalentín, the Val d'Agri, and the Alentejo

Narratives

Nine narrative storylines ranging from 100 words to 8 pages were constructed by the facilitators of the subgroups, containing rich information about both the process of group discussion and the results of that discussion. It is impossible to outline the rich variety of stories that were the result of the first workshop. One good example of the manner in which some groups successfully attempted to bridge the gap between global and local driving is the scenario that was drafted in the Val d'Agri. It is based on a hypothetical English cheese trader who, in 2030, has stable relationships with people in the Val d'Agri. He therefore knows and understands the region and can give his external vision of the area:

"This hypothetical cheese trader uses Internet to do business with shepherds in the Val d'Agri. Those farmers are highly organised, using new technologies and new market possibilities. They successfully combine this with existing local production knowledge and historical and cultural values. The relationship between those two different worlds creates the possibility to learn from each other and results in a close friendship. Every year in March/April the cheese trader and his family go on holiday in the Val d'Agri. They stay in one of the guesthouses of the same shepherds with whom they do business. Many of those farmers have sought off-farm employment and have organised themselves offering apartments and other holiday possibilities. Besides these lodging activities, farmers are also promoting eco-tourism in the area. Walking tracks are laid-out and offer the possibility to discover the archaeological and natural beauty of the area. The relationship between the trader and the shepherds is mutually beneficial. The farmers increase their income, the trader develops an intimate relationship with the Val d'Agri, and both gain many new experiences and learn much from each other."

This locally oriented story is set in a broader perspective:

"The developments started approximately 25 years before, when the battle to stop exploitation of oil in the region began and was later lost by the oil companies. The main reason was the far-reaching collaboration of most formal (local governments) and informal (NGOs) institutions. The main objective

of this new powerful integrated framework was to strongly promote local development in a sustainable way, thus preserving local identity (social capital) and preserving the environment. As oil extraction within the boundaries of a natural park did not comply with this objective, the brave decision was taken to end the activities in the region, despite the loss of income. This decision was approved of by many and thus increased the social cohesion."

3.4 Comparing local scenarios

Although resulting local scenarios were sometimes (very) different, in general the three Mediterranean scenarios were received similarly in the three regions:

Convulsive Change was perceived to be closest to the present day reality in all regions. Main driving factors are drought, increased importance of tourism, water transport, and outmigration, all factors that to some degree are currently important in all regions. Participants could clearly relate to the future that was sketched at the Mediterranean level and could imagine a future given these main driving forces. Resulting scenarios were therefore relatively long, rich in detail, sometimes spatially explicit (see Figure 4), and gave a clear image of local changes and the situation in 2030. The main drawback of presenting local stakeholders with a future that is relatively close to what they currently experience, is that they constructed stories that almost read like 'business as usual' scenarios and contain relatively few surprises, as participants were not really challenged to discuss new problems or opportunities.

The other extreme is *Big is Beautiful*. This scenario sketches a series of developments that deviate enormously from present day reality. On top of that, developments of key driving forces change at least once during the course of the scenario. For example the EU first swells to 36 countries, but later falls apart again. Besides, the situation in 2030 is highly uncertain and unstable, whereas the end point in the other scenarios is close to a new equilibrium. It is beyond the scope of this paper to discuss the value of a scenario like this in other applications, but a conclusion of the first series of workshops is that Big is Beautiful might be too far from the present day reality of local stakeholders in a rural community in the Mediterranean region. Participants lacked confidence in their expertise on imagining such a future and resulting stories were either presented as multiple futures (Val d'Agri), rejected many of the developments at the Mediterranean level (Alentejo), or translated those developments to present driving forces (Guadalentín). Another general tendency was to focus on short-term developments (enlargement of EU) and ignore longer-term changes (breaking up of EU and formation of Southern Alliance).

Knowledge is King is in many way a scenario that combines the good points of both others. Like in Convulsive Change there are a number of factors that strongly relate to the present or immediate future. For example, seasonal and later permanent tourism strongly increases; (new) water transport networks are constructed, and new technologies (water desalination, new crop types) are adopted and become affordable. Other developments, however, are based on surprising new factors much like in Big is Beautiful. A life extension drug indirectly triggers the formation of a European Sun Belt, while a growing divide between the 'connected' and the 'unconnected' is established. This mix of new and familiar developments lead to a creative process in all regions and resulted in scenarios that were both rich in detail and in surprising developments and solutions. Particularly the scenario developed in the Val d'Agri unfolds like an story that combines day-to-day details and large-scale changes, without becoming unrealistic.

4. Discussion and conclusions

4.1 Downscaling scenarios

There are various aspects of the methodology that influenced the success of downscaling European/Mediterranean to local scenarios.

From urban to rural European scenarios

One of the key underlying assumptions when adapting existing scenarios, is that the original scenarios capture the main developments that are important in the new setting. As the original scenarios focused more on, developed, urban-influenced areas, as opposed to the rural, isolated Mediterranean, this is not necessarily the case. Although the scenarios themselves do include Mediterranean-specific issues, the variety of scenarios might not. This has consequences for the acceptance of the European scenarios. Local stakeholders in all areas noted the lack of a scenario that specifically dealt with agriculture. Too many issues could not be influenced by local stakeholders that thus had problems relating to the stories.

From European to Mediterranean scenarios

This was a relatively straightforward exercise, mainly highlighting nationally and locally important issues, without fundamentally changing the scenarios. Again, the question is whether the three scenarios cover the variety of changes that might occur in the Mediterranean. Two remarks on the Mediterranean were made in all areas:

"All these scenarios are so negative. Are we doomed?"
(Participant in Spain during presentation of Mediterranean scenarios)

"Why is the area limited to the Northern Mediterranean, while developments in Northern Africa are much more important"
(Monica Caggiano, facilitator of the workshop in the Val d'Agri)

Thus, participants felt that the Mediterranean scenarios as they were presented did not cover the entire spectrum of possible future in the Northern Mediterranean. Figure 5 illustrates the potential loss of diversity of scenarios that were constructed to cover a broad variety of urban-oriented futures, when translated and downscaled to the Mediterranean level. The pie-charts are hypothetical, but do illustrate how scenarios become increasingly similar, despite their original variety.

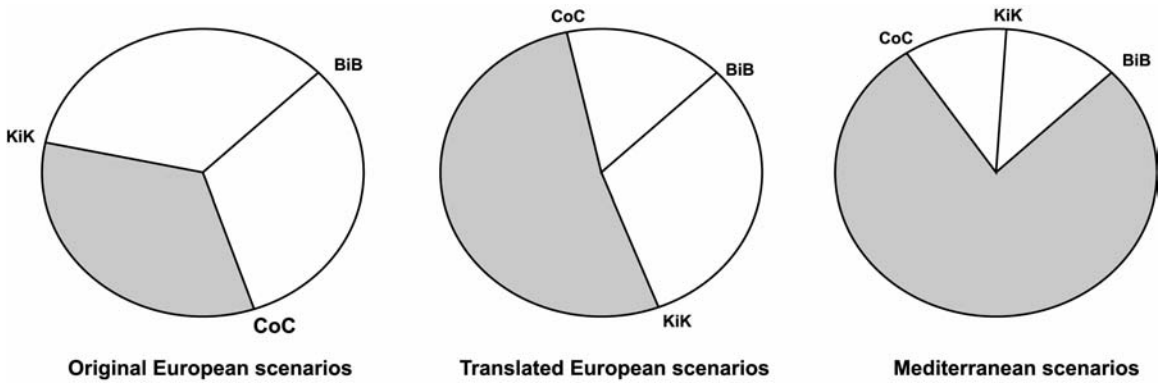

Figure 5. Hypothetical loss of diversity of scenarios when adapting existing scenarios. Grey shades indicate share that is not covered by scenarios

Although using and adapting existing scenarios has disadvantages, the advantages of being able to build on existing work, rather than to repeat a time and money demanding process like was executed during the VISIONS project are by far more important.

From Mediterranean to local scenarios
Another key element is the question how much to explain to the stakeholders of the developments in the Mediterranean scenarios. We opted for informing them as little as possible, limiting the presentation to 6-10 images with a very general storyline. The more information is given to them, the more they could repeat in the local scenario. By starting the day with a discussion on the present situation, we attempted to fix their attention on the local factors, while simultaneously it provided us with a tool to 'check' whether locally important elements were incorporated.

Surprises in the local scenarios
Key to the acceptance, however, is not the origin of the scenarios, nor their variety, nor the way they are presented but the relation between the Mediterranean stories and the present day reality in the local areas. As stated in the results, the three Mediterranean scenarios were received very differently. Participants were stimulated most by the scenario that contained a number of surprising developments without deviating too much from the present reality of the local stakeholders (Knowledge is King). The scenario that stuck close to reality did not stimulate the creative thinking process (Convulsive Change), while stakeholders had problems identifying with the scenario that presented an almost entirely different future (Big is Beautiful). Balancing on this thin line between stimulating surprises and paralysing shocks is the key to successful downscaling. This conclusion thus weakens the plea for surprises in scenarios that should "keep the stakeholders awake at night" (Xiang and Clarke, 2003).

Irrespective of the method used for downscaling, it has to be concluded that maintaining the link between multi-scale scenarios comes at a price. Resulting local scenarios will at least partly repeat higher-level developments that are accepted without questioning. Additionally, the variety between and within local scenarios is likely to be lower than when they would be developed independently.

4.2 Upscaling from local to Mediterranean
The workshops in three different countries provided important indications, other than what was already present in the original stories, of how the Mediterranean region will develop under the three different scenarios. Most additions relate to the social capital, and deal with (loss of) cultural identity, resistance to change, but also with what changes are viewed as opportunities. For instance, local stakeholders are willing to accept the formation of a European Sunbelt (KiK) and see great opportunities e.g. for ecotourism and new local market for various agricultural products. The enlargement of the EU to 36 countries (BiB) is viewed as a large threat, triggering more unwanted inmigration and rural outmigration, leading to a loss of cultural identity. Changes under this scenario were originally envisioned to be very large, but might be limited in rural communities. The impact of drought and desert formation (CoC) might be less than envisioned in the original Mediterranean scenarios, given the matter-of-fact acceptance by local stakeholders.

Thus, the method of using Mediterranean scenarios as boundary conditions for the local scenarios has large advantages for upscaling back to the Mediterranean region. By linking local scenario development to assumed Mediterranean developments, resulting local scenarios can more easily be generalised and extrapolated to the entire Mediterranean region.

4.3 Complementarity of other methods

The method discussed in this paper was complemented with two other approaches to develop local scenarios during a second series of workshops (see Kok et al., subm.). Table 1 summarises the three methods and their main (dis)advantages. Extending current trends is easy to explain, but will not lead to surprising results; backcasting results in (desirable) scenarios that illustrate the opinion of the local stakeholders, but the method proved difficult to convey. The forecasting method as explained here, maintains the link with the Mediterranean scenarios, but depends on a high input from the facilitators.

Table 1. Advantages and disadvantages of scenario methods employed

	Current trends (2^{nd} workshop)	*Forecasting (1^{st} workshop)*	*Backcasting (2^{nd} workshop)*
Advantages	Easy to explain Vivid discussions	Linked to Mediterranean scenarios Creative process Group process	Appealing to stakeholders Opinion of stakeholders
Disadvantages	Short-term future No surprises	High-input from facilitators	Independent scenarios Method difficult to implement

This table serves to illustrate the point that a variety of methods have a variety of advantages, which – when combined – will lead to a overall knowledge that far surpasses any of the individual methods. Following the reasoning of Hines (2002) from a business perspective, we advocate the construction of a tool kit for scenario development in earth sciences in general and Integrated Assessment in particular.

5. Conclusions

- Using higher-level scenarios as boundary conditions during lower-level scenario workshops has important advantages, when the aim is at integrated information from both levels. Maintaining the link ensures development generally uniform yet locally differed scenarios.
- Using higher-level scenarios as boundary conditions, however, also entails important drawbacks. Although some of the potential problems are practical rather than fundamental, resulting local scenarios are likely to partly repeat higher-level stories and the mix of scenarios will be less diverse.
- A tool kit for scenarios needs to be constructed for scenario development methods in Integrated Assessment, in order to use the best of a number of scenario-developing methods.

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