



Using Scenario Planning to Prepare for Uncertainty in Rural Watersheds

Kelly Mott Lacroix, Ashley Hullinger, Mark Apel, Kathryn Banister, Bill Brandau, and Sharon B. Megdal

Introduction

Planning for an uncertain future presents many challenges. Thinking systematically and creatively about what is in store through a process called scenario planning can help illuminate options for action and improve decision-making. This guide focuses on a process for developing scenarios to help communities and watershed groups explore what might happen in the years to come, make more informed decisions today, and build a watershed management process. The systematic approach to scenario planning described here is based on the lessons learned through a yearlong scenario planning process in the Upper Gila Watershed in southeastern Arizona and Water Resource Research Center's (WRRC) research on scenario planning.

As more communities are confronted with landscape-scale challenges, scenario planning has been used as a decision-support tool by federal agencies, non-profit organizations, local governments, and others to assess risk. Examples of scenario planning are wide-ranging; from a large-scale endeavor such as evaluating future water supply and demand of the Colorado River Basin, to a smaller scale effort like municipal water planning (Bureau of Reclamation, 2012; Scott et. al., 2012). Through considering the existing natural, social, and economic conditions, scenarios challenge commonly held assumptions that the future will be like the past or present. If approached systematically, scenario planning can help you make decisions today that will perform better over time by: 1) providing insight into the major driving forces of change that shape the system; 2) revealing implications of following the status quo; 3) exploring possible futures; and 4) illuminating options for action. Scenario planning is not an attempt to predict what the future will bring, nor a process to envision the ideal future for a community. It is an acceptance of uncertainty and a way for you to prepare for the wide range of events that may come to pass.

A successful scenario planning process relies upon the knowledge and expertise of stakeholders within the community to guide the development of scenario topics. While the outcomes of scenario planning are unique to each community or organization, there is a general process that can be followed.

This guide provides a brief overview of scenario planning and the steps you would take to conduct your own scenario planning process.

What is scenario planning?

Scenario planning is a decision-support tool that can inform resource management in times of high uncertainty. The premise of scenario planning is that if you understand the forces that impact today's decisions, you will make better decisions for the future. Fundamentally, scenario planning helps you understand what drives change in your watershed. *Scenarios themselves are summaries of different ways the future could unfold, and usually take the form of narratives, or stories, that describe the future at a given point in time.*

There are many approaches to scenario planning. These approaches generally fall into two broad categories, normative and exploratory. Normative scenario planning is similar to traditional land use planning, and seeks to establish a vision for what communities would like their region to look like or an ideal or desired future. Exploratory scenario planning, on the other hand, "describes how a future might unfold and the range of possibilities that could occur" (Oliver, 2014). Normative and exploratory scenario planning are not mutually exclusive. On the contrary, exploratory scenario planning can help you formulate a more realistic vision or ideal future that optimizes sound land use and watershed management decisions and helps communities of your watershed become more resilient. This guide is designed to take you through an exploratory scenario planning process, and therefore "scenario planning" throughout the document refers to an exploratory scenario planning process.

Why Scenario Planning?

The benefits of exploratory scenario planning include: increased understanding of key uncertainties, incorporation of alternative perspectives, and resiliency in decision-making (Peterson, 2003). In a watershed context, the process of scenario

planning has benefits beyond written narratives about potential conditions because it requires that a variety of community members, many of whom may not work together on a regular basis, come together and share their perspectives on how the watershed works and what influences change. A diverse mix of community members and experts helps to establish a mutual understanding of the changes in the watershed and prioritize key uncertainties. Developing scenarios as a group exercise will help the communities of your watershed develop a shared vision of emerging challenges and opportunities, which can build relationships and prepare you to address what the future may bring. Other benefits of convening a scenario planning process include: determining the most effective way to implement actions, developing options and criteria for assessing options and identifying information gaps (Rowland et. al., 2014). Refer to Box 1 for specific examples of applications and outcomes from the U.S. National Park Service’s scenario planning process.

Box 1. Examples of Scenario Planning Applications (NPS 2013)	
Planning and Decision Making	Assateague Island National Seashore used scenarios to inform its general management plan, specifically exploring alternatives to vulnerable operations and infrastructure subject to sea level rise and storms.
Resource Stewardship and Monitoring	Workshop participants identified groundwater resources on park land, critical to the health of wild horses, that are likely vulnerable to climate change. Because of the scenario exercise, the park incorporated groundwater into its monitoring program.
Infrastructure, Transportation, Operational Decisions	In consideration of sea level rise and storm surge that threaten dunes and infrastructure in all scenarios, the park decided to expand its use of portable infrastructure.
Bridging Mechanism to Build/Expand Partnerships	Many tribal partners were invited to the workshops and expressed interest in the process, generally and for tribal use. Maintaining connections and the possibility of conducting scenario exercises in tribal communities were fruitful outcomes of the process.
Communication and Education	The compelling, science-based stories produced by scenario planning were passed to interpreters to convey how climate change could affect the park in exhibits at park visitor center. Additionally, park staff gained a common understanding of how climate change may affect the park, useful for long-term planning and strategy.

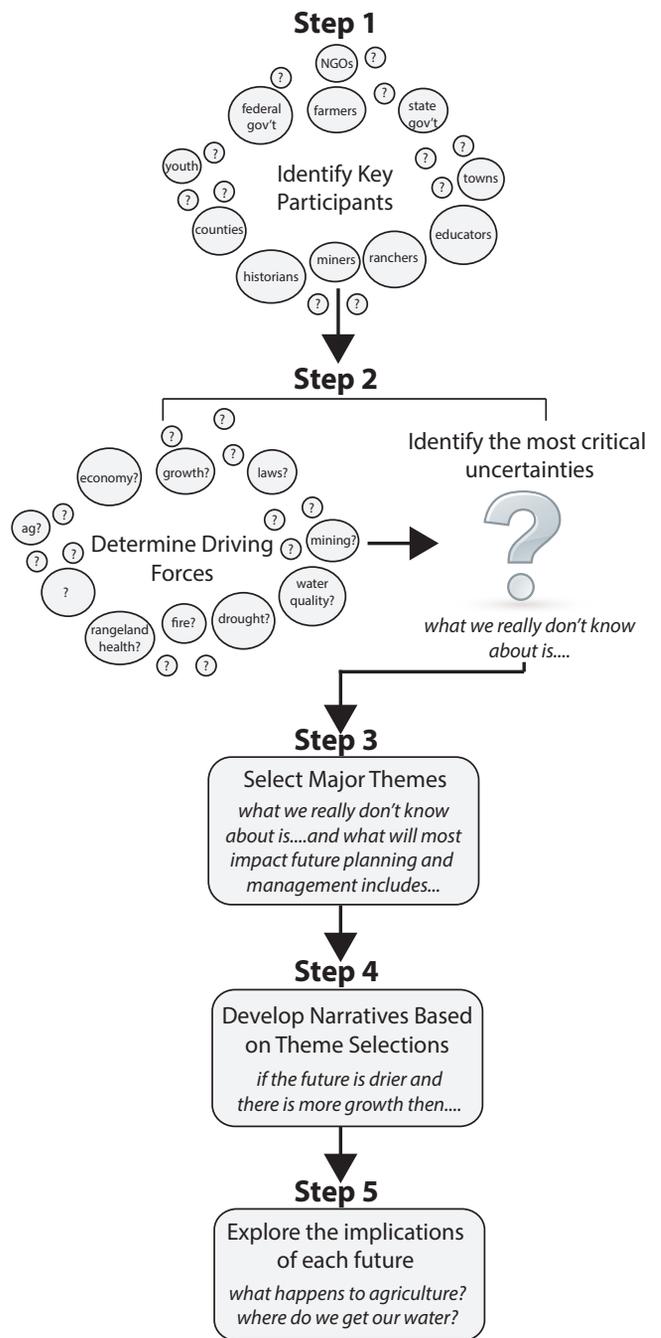


Figure 1: Scenario planning process

Developing Your Scenarios

The scenario development process presented here follows a series of steps that are modified to fit the needs of community-based watershed planning. The remainder of this guide will take you through the five steps of the scenario planning process outlined in Figure 1. As you work with stakeholders in your watershed to build scenarios, it will be important to remind yourself

and those working with you that the overarching purpose of scenarios is to: *inform future planning decisions through collaboration among stakeholders and shared understanding of*

what drives changes to the natural and social environment of your watershed.

In order to fully benefit from exploring uncertainty and driving forces of change, it helps for everyone involved to have a good understanding of the watershed as a system. Providing a baseline assessment of watershed conditions is one way of ensuring that all participants have a concept of the watershed as a whole. Having secured an understanding of how the watershed works, it is time to establish the purpose for, and basic elements of, scenario planning. This shared understanding of the process and goals begins with identifying the most important scenario elements: driving forces of change and major uncertainties. Clearly defining these elements and being steeped in their meanings will aid in your ability to fully utilize scenario planning and communicate about the process with ease. You may find it helpful to begin any meetings, interviews, or workshops with a refresher on these key concepts, as they can be confusing at first to people who are not familiar with scenario planning. Box 2 provides a definition of and examples for each term.

Step 1: Identify Participants

Creating scenarios requires that a variety of community members, many of whom may not work together on a regular basis, come together to understand changes in the watershed and prioritize key uncertainties. The first step in building scenarios is to determine who should participate, or who is a stakeholder. At its simplest, a stakeholder is anyone who has a stake, a claim, or an interest in the outcome of the scenario planning process. Examples of stakeholders include but are not limited to: local, state and federal governments; non-profit community organizations; watershed groups; schools, community colleges and universities; politicians and political parties; historians; businesses including industries like mining and agriculture; and religious groups. This larger set of stakeholders will be those that you invite to workshops to build scenarios and ask to review and change your scenario narratives. Many of them will likely not participate throughout the entire process or not participate at all, preferring instead to stay informed of the scenario development process.

As you create your scenarios it is very important to keep all stakeholders informed of the process, and offer them various opportunities to engage in discussion about the development of the scenarios. These opportunities can come in the form of workshops, surveys, individual meetings, or forums to review draft documents. Identifying and engaging with a broad set of stakeholders is key to the scenario planning process because scenarios are the result of stakeholders' experience and perspectives of the major driving forces of change in your watershed. Proceed with care: without the full participation by a broad set of stakeholders, the process may be perceived as lacking legitimacy and provide motivation to excluded groups to undermine the use of the scenarios.

An important subset of this larger group of stakeholders are those participants who will be involved in all aspects of building the scenarios. These "key" stakeholders fall into two categories: those who are most likely to use the scenarios as part

Box 2. Key Concepts and Terms
Scenario Planning
A process that can be used to help communities plan for the future in times of high uncertainty by helping participants understand the forces that impact today's decisions, so they will be able to make more robust decisions for the future. Scenario planning answers the question: How can we use what we know about today to understand what might happen in the future? Examples: See Box 1
Driving Forces of Change
The social, political, economic, and environmental factors that influence and change a watershed. Driving forces answer the question: What shapes our watershed? Examples: Climate change, population growth, advances in technology, water availability, politics.
Critical Uncertainties
The potential changes to the watershed that would have the largest impact on a system, but are out of the control of communities within the watershed. They are the largest unknowns about the future that are also most significant to the watershed due to their level of "uncontrollability" and potential impact. Critical uncertainties answer the question: What driving forces of change are most uncertain and will have the greatest impact on our future? Example: Average cotton prices were determined to be a critical uncertainty in the Upper Gila Watershed, because of the social and economic importance of cotton to the watershed combined with the uncontrollable drivers that influence its success. Major Themes
Major Themes
An issue around which there is great uncertainty and which would collectively have the widest range of implications for the future of the communities and ecosystems within the watershed. The themes answer the question: What critical uncertainties have the broadest implications/ greatest potential impacts and are therefore the most important to understand and plan for? Example: The impacts of tamarisk leaf beetle was a critical uncertainty in the Upper Gila Watershed and selected as a meta-theme due to the range and severity of possible implications associated with its arrival – for riparian areas and beyond – and considering the strong influence of other drivers such as fires and intense storms.
Scenario Narratives
Focusing on the possible trajectory of a scenarios, a "story" approach to exploring the events that could unfold in the future. Example: See Box 3

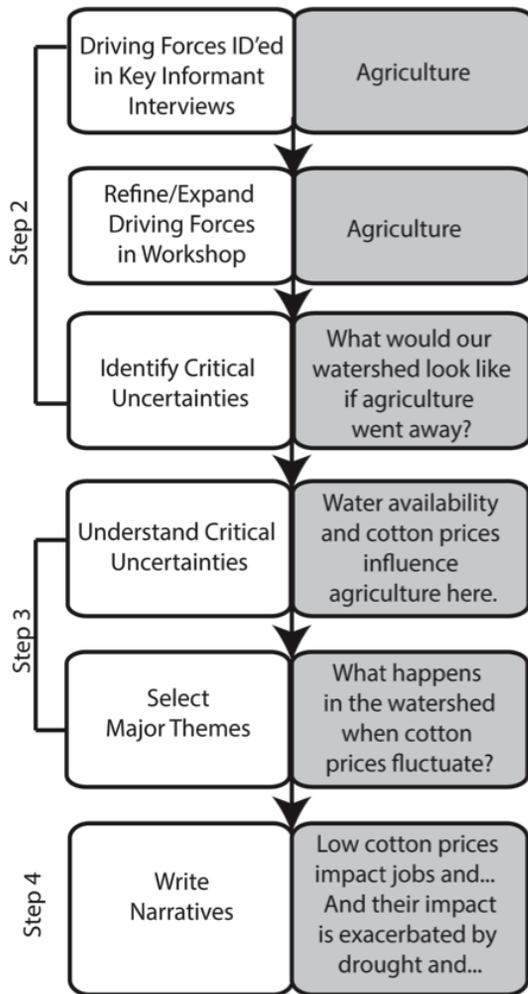


Figure 2: Through the process of scenario planning, a driving force of change evolves from a topic, such as agriculture, into a detailed description for the future, such as the impact of fluctuating cotton prices on the watershed.

of their own planning and management and those who have unique knowledge about the history and current conditions of the watershed. Oftentimes one person or group will fit into both categories. Examples of key stakeholders include local government, who can use the scenarios for land-use planning and management, and multi-generational residents of the watershed, who can provide valuable perspectives on what drives change in the watershed and how those drivers have impacted the watershed in the past. We recommend that you formalize this group of key stakeholders into a steering committee for the scenario process. The steering committee will serve as your primary contact for information on driving forces of change, determination of the scenarios, and review of the scenario narratives. Selecting individuals for the steering committee should be based on: engaging a comprehensive mix of stakeholders, e.g. local governments, major industry sectors, federal agencies, non-government organizations, etc. and ensuring a diversity of technical expertise and leadership within the communities. Ideally, your steering committee will have no more than 12 people because the larger the group the more difficult it will be to bring them together at the same time.

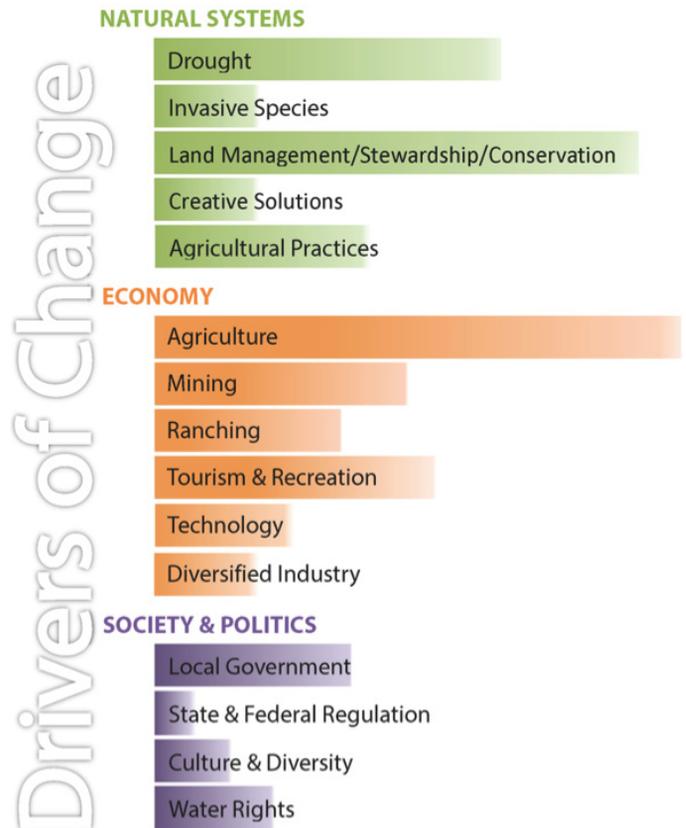


Figure 3: Examples of major drivers of change, as identified through key informant interviews in the Upper Gila Watershed. Length of bar on the graphic indicate the number of interviewees that mentioned the topic as a driver of change

During initial steering committee meetings you should introduce the scenario planning process and the key terms (See Box 2). It will also be important to draft a problem statement and set limits for the process by deciding on the appropriate time frame and scale for planning. A problem statement answers the question: What are we planning for? This problem statement, once formulated, serves as the anchor for all subsequent discussion and activities in scenario planning. These elements will be reviewed and finalized in the first scenario-planning workshop with the larger stakeholder group. Providing the workshop participants with ideas to react to and change, as opposed to spending time during the workshop brainstorming ideas, will help you use the limited time you have with them more effectively.

Step 2: Identify Driving Forces

The next step in scenario planning is identifying driving forces. Much like establishing a problem statement, identifying driving forces should begin with the steering committee members through individual interviews. Starting with just a few individuals will provide you with the opportunity to learn what forces shape the watershed, better understand the perspectives of your steering committee members, and determine what issues are of shared importance to a variety of stakeholders. These initial interviews about driving forces



Figure 4: Major themes are a subset of critical uncertainties and driving forces. The line between each subset of the driving forces is dotted to demonstrate that larger driving forces play a role in critical uncertainties and both critical uncertainties and driving forces are important to the scenario themes.

of change, also known as “key informant” interviews, will provide the larger group of stakeholders ideas to react to in subsequent workshops, which will make more efficient use of the time spent in workshops to refine rather than generate ideas. For an example of how these driving forces evolve into the final scenarios, see Figure 2.

All participants in the key informant meetings should be asked the same questions about what drives change in the watershed. To make these interviews productive, it is important that your questions are clearly and carefully phrased. In crafting your questions we suggest you:

- Single out certain categories of drivers and ask separate questions about them. Start with “STEEP” (Society, Technology, Economy, Environment, Politics) analysis and modify or add categories as needed (Wiseman et. al., 2011).
- Categories for driving forces of change that we found useful were natural systems, economy, and society and politics. Technology is another possible category of drivers, which we grouped with “economy,” but could stand on its own in many cases. For example, one question might ask “thinking ahead to 2030, what do you think the economy of your watershed will look like?”
- Ask the interviewee to distinguish between their professional vs. personal perspectives
- Inquire about driving forces of change in the past, present, and future of the watershed
- Ask questions about time steps that are in the future, but not so far into the future that the interviewee will have trouble answering them (e.g. 20 years ahead as opposed to 100 years)

Responses from the key informant interviews are your rough draft of the driving forces of change in the watershed.

Examples of initial drivers from the Upper Gila Watershed in three different categories are shown in Figure 3.

The next step in the process is to engage with a much broader group of stakeholders through a scenario-planning workshop. The primary goal of this workshop is to bring together community members and decision-makers to collectively determine the most important drivers of change and items of critical uncertainty in the watershed. It is important that attendees of the workshop represent different interests within the communities of the watershed in order to identify all possible driving forces within the watershed.

The workshop should contain four steps:

1. Agreement upon a problem statement that addresses why the participants are concerned about the future and interested in scenario planning. It addresses the question: What are we planning for?
2. Identify driving forces that shape the future of the watershed
3. Rank driving forces in order of importance or relative impact on the watershed
4. Identify most critical uncertainties, i.e., the unknowns that are most likely to shape the future of the watershed

The resulting products of the workshop include:

- An agreed-upon problem statement that unites everyone in the room with a common purpose for planning in the watershed
- A list of the most important major driving forces of change in the watershed.
- A list of the drivers of change that are critical uncertainties, i.e., major unknowns that could determine what the watershed looks like in the future

Scenario planning will likely be a new concept to many of your participants; therefore, it is important to have time to address people’s questions at every stage of the workshop. We also found it helpful to remind workshop participants of the basic elements of scenario planning by displaying signs with the definitions of words with specific meanings to the process, such as “scenario”, “driving forces” and “critical uncertainty.” Simplifying complexity with visual representations and illustrations can also aid comprehension of how the parts of scenario planning fit together. For example, Figure 4 demonstrates that critical uncertainties are a subset of driving forces and the scenarios are a subset of critical uncertainties.

Diversity of opinion is important to developing comprehensive scenarios. In order to incorporate as many perspectives as possible, it may be necessary to conduct multiple workshops or smaller-scale focus groups to get input from a missing group of stakeholders. One way to identify missing perspectives is to ask your steering committee who else should be consulted in the process. Another way to identify missing perspectives is to examine the list of driving forces created in the first workshop and determine if all of the interests behind those drivers have been represented in meetings or workshops. For example, if agriculture is listed as a driver of economic change, farmers from the watershed should be consulted or if groundwater

availability is discussed, hydrologists who have studied the area should be interviewed. You will likely not be able to get input from all missing interests; however, it is very important that you seek participation from any groups who are associated with critical uncertainties.

Step 3: Select Major Themes for Scenarios

The major themes (or issues) selected for the final scenarios will be a subset of the larger list of driving forces and critical uncertainties (Figure 4). To develop the major themes, you will need to understand the uncertainties that are of greatest concern to the stakeholders and distinguish the drivers that could influence a critical uncertainty. Additionally, understanding why there is uncertainty in the first place is often important for developing a theme. For instance, is the uncertainty generated by ambiguity (i.e. incomplete knowledge, multiple interpretations of an issue, lack of awareness about a process) or other factors? A comprehensive analysis of the critical uncertainties is helpful in selecting a theme with the appropriate depth and utility for your community.

Narrowing your themes and understanding what drives them can be accomplished in a variety of ways, including steering committee discussions and surveys. Meeting in person allows more discussion of the possible scenarios, which is beneficial for both the convener and stakeholders to gain greater clarification and insight into what the resulting scenarios could look like. Online survey applications can be powerful tools that are generally cost-effective and convenient to distribute and analyze. They also have the advantage of allowing people to participate and provide input on their own time. In determining the critical uncertainties of greatest interest and the key aspects of these uncertainties, we found it worthwhile to use an online survey and in-person meetings with the steering committee. An example of the critical uncertainty of farming and its key unknowns is shown in Figure 2.

Perhaps the most critical part of the process is selecting the major themes for the scenarios. To simplify the selection process we have broken it down into three steps that each have actions and outputs.

Steps for Selecting Major Themes:

1) Define critical uncertainties within the watershed context

- **Action:** Use additional sources, such as a watershed baseline assessment or journal articles, to compose brief summaries that include background and context for the top critical uncertainties provided by stakeholders in Step 2 of the Scenario Planning process.
- **Action:** Identify forces outside of the watershed that could influence the trajectory of each critical uncertainty.
- **Output:** Brief summaries of the critical uncertainties within the local context and broader context

2) Make connections between the critical uncertainties and the driving forces

- **Action:** Use color-coded notecards, or another organizational system, to represent critical uncertainties and major driving forces. On a large board, organize the notecards to visualize the connections and overlap between the different critical uncertainties as well as other drivers of change. Which critical uncertainties impact and are most impacted by the major drivers? Note the critical uncertainties with the greatest number of connections to the major drivers – these will be your candidate critical uncertainties.
- **Action:** Identify gaps. Based on this research and evaluation, are there any critical uncertainties or connections to larger issues not reflected in the list of drivers and critical uncertainties provided by stakeholders?
- **Output:** A set of candidate critical uncertainties, as well as a logic behind your selections, to present to stakeholders for review

3) Present candidate critical uncertainties to stakeholders for final selection of scenarios

- **Action:** Communicate and discuss the scenario candidates with stakeholders, preferably in a group meeting to encourage discourse and a variety of ideas. Considering previous stakeholder feedback, this scenario evaluation, and research gathered up to this point, what critical uncertainties have the broadest implications or greatest potential impacts and are therefore the most important to understand and plan for?
- **Output:** A list of final scenarios for the narratives

The strategic selection of major themes to develop scenario narratives should be the product of everything learned up to this point in the scenario planning process. The final selection of themes is a prime example of the importance of a convener in a scenario planning process. In the selection of the themes, it is the convener's role to mediate the natural urge of people to vote for scenarios that reflect a future that they would like to see, rather than what is possible and would be most useful for planning. Overall, the goal is to select major themes that will push the community to think more broadly and proactively about their planning decisions in light of forces that will stress the system in question (Caves et. al., 2013).

Step 4: Develop Scenario Narratives Based on Major Themes

Individual interviews with stakeholders, especially stakeholders involved with planning on a local, state, or federal level, is a good way to gain insight for your scenario narratives. To create specific and thought-provoking questions, look to your list of major drivers and critical uncertainties and consider for yourself what would happen if two major drivers were to intersect at a given point in time. Try not to limit all of your questions to be directly related to your theme, but instead focus on the interaction between major drivers. If framed in

this way, the answers that you receive will most likely contain valuable information about individual drivers and possible events for a scenario, which will be useful when writing the scenario narratives. A few examples of questions that elicited useful, and often surprising, responses from stakeholders in the Upper Gila Watershed include:

- If drought persists 20 years into the future and population doubles, what would your community look like? What kind of water conservation measures are currently in place or could be put in place if the drought continues and the population increases significantly?
- If tamarisk beetle rapidly defoliates areas along rivers and washes and there are a series of large fires in the uplands that remove vegetation, what do you think the future will look like? What would your organization do to react to this?
- If there was a severe economic downturn (due to decreased mining, for instance) and the drought was to continue or worsen, what do you think the impacts would be?

Scenario narratives are the culmination of the process and should translate the extensive range of stakeholder knowledge, opinions, and values into meaningful storylines that focus on the chosen themes or issues. Combined with scientific research, the narratives can weave intricate and insightful stories about possible futures that lie ahead. The power of the scenario narratives lies in their ability to connect with the involved communities and evoke feelings of power and immediacy of their land use and policy decisions to either positively or negatively impact the watershed in the face of uncertainty. Scenario narratives illustrate the dynamics affecting a system, by highlighting how major driving forces and actors can interact to produce highly plausible, and often very different, alternative futures (Peterson et. al., 2003).

Drafting scenario narratives is a creative process that requires you to use the scenario elements and resources you have collected. These resources include:

- The problem statement to begin and focus the discussion of the scenarios
- Three to four final major themes determined in Step 3
- A list of major drivers that influence the watershed and interact with the scenario
- A list of critical uncertainties
- Stakeholder ideas of possible scenario events, received in review sessions and individual interviews

With these resources in hand, you will organize the many possibilities into usable, readable formats. Organization is critical to creating readable narratives. To give context and fuller meaning to the scenario narratives, we recommend starting with general descriptions of the major drivers of change individually and their general role within a watershed. Beginning with a strong understanding of the major drivers “starring” in each scenario allows your reader to more fully see the impacts and relationships of the events that play out. It

is also important to introduce each scenario with background information on the issue as well as reasons why it is important to the watershed.

The narrative itself should be organized by the different selected themes. Each narrative will consist of a clear, detailed statement of conditions at a specific point in the future or broken into time steps, such as 2030, 2040, etc. You will then build the “story” by contemplating how each major driver could impact and be impacted by the major theme in that time step, as supported by stakeholder input and research. Within these storylines, the assumptions of the scenario and the differences between stories must be clearly visible. Memorable titles such as “Eat and Run: Impacts from the Tamarisk Leaf Beetle” or “Mayberry versus the Beltway: Local to Federal Control” used in the Gila scenario process can also help participants keep track of the different scenario narratives. To be plausible, each scenario should be clearly anchored in the past with the future emerging from the past and present in a coordinated manner (Peterson et. al., 2003).

The following are questions to consider when creating your scenarios:

- **Relevant:** do the scenarios deal with the issues and problems of greatest interest and priority to communities within the watershed? Contributing insight on important issues in the watershed will increase the likelihood of the scenarios being a highly useable resource for planning purposes.
- **Plausible:** could the scenario events happen? While scenarios may contain surprising twists, the surprises must occur for specific reasons. Scenarios lose efficacy if they are not believable.
- **Memorable:** are the scenarios distinct and do they leave a long lasting impression? Each of the scenarios should have specific outcomes without much overlap.
- **Scientifically sound:** what research exists to explain the course of scenario events? Scenarios cannot be backed entirely by scientific study, but where possible, citations and peer-reviewed sources should be used to explain the sequence of events. This will provide credibility to the scenarios, as well as provide further sources of information for those using the scenarios in planning.
- **Comprehensive:** is a range of drivers represented by the events of each scenario? It is impossible to incorporate all possible drivers into a scenario, but there should be a great effort to account for those drivers of greatest consequence for land use planners and decision makers. Sometimes this requires consideration of drivers outside the watershed, such as the national/international political climate, national/international economics and commodity markets, actions of neighboring communities, etc.
- **Challenging:** do the scenarios broaden perspectives and test normal expectations? One of the responsibilities of the convener is to venture outside of the usual assumptions.

Box 3. Sample Scenario Narrative

Year 10 (2025): One or more species of tamarisk leaf beetle has arrived in the watershed, beginning the process of defoliating stands of tamarisk trees. Particularly during the late spring and early summer, when the beetle is most active, areas of dense tamarisk will appear heavily damaged by the beetle. Widespread and rapid loss of vegetative cover, as well as salt cedar mortality, results in loss of microclimates and habitat for a variety of animals and plants. These circumstances will be particularly negative for nesting habits of the federally endangered southwestern willow flycatcher. Some of the largest known populations of the southwestern willow flycatcher are located in the Upper Gila, and threats to their habitat within stands of tamarisk results in federal actions to protect flycatcher habitat. The extent of federal involvement will depend on the perceived threat to breeding populations of flycatcher.

Extended drought has added to the stress experienced by tamarisks under attack by the beetle. Large concentrations of dead or dying tamarisk, with the increased collection of dry leaf litter, will increase the fire risk in riparian areas. This is particularly threatening in the dry season before the summer rains and increased surface flows in the Gila. Fires result in decreases in water quality, including increases in pH, salt, and potash, which would complicate the use of surface flows for agriculture. Aquatic life is negatively impacted, raising the concerns of the US Fish and Wildlife Agency. Since most residents of the Valley live near the river, the smoke and airborne particulate matter dissipate slowly and present a health hazard to many, especially vulnerable populations. Atmospheric inversions trap the smoke at low altitudes and prevent dissipation. Public health campaigns, however, are successful in increasing local awareness about the dangers of poor air quality.

The degradation of the riparian buffer and loss of the dense network of tamarisk roots have also led to major soil erosion. Increased nutrient loads are carried into the river by runoff. Flooding potential has also increased for similar reasons, as stormwater flows would enter the river more quickly and in greater volume than otherwise. The destruction caused by flooding events is exacerbated by the increase in detritus and plant matter from the dead tamarisk. Infrastructure, such as bridges and diversion dams, are heavily damaged during flood events.

Even in areas of high tamarisk mortality, other opportunistic species (native and non-native) move in to fill the niche, with the result that ET levels quickly reaching earlier levels within a few years. The decline in tamarisk as a dominant species has led to the rapid infill by other plant communities, with increases in ET and very little change in the long-term water supply availability.

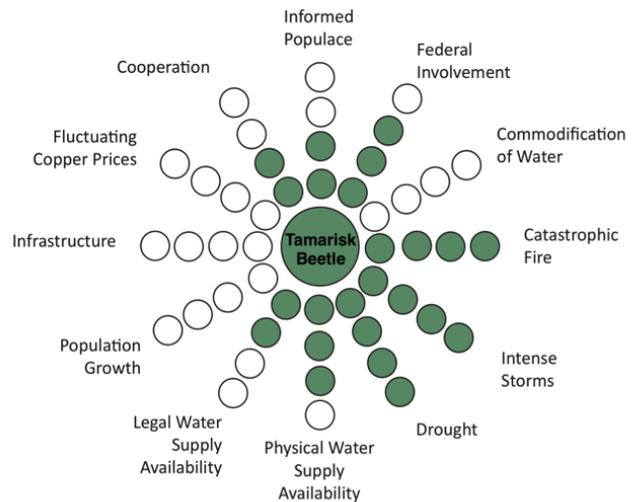


Figure 5: Relative influence or impact of the major drivers for the Tamarisk Scenario in the Upper Gila Watershed. A graphic such as this can help with delivering brief interpretation of dense text and complex relationships. The significance of each driver to this scenario is simply indicated with colored circles. In the case of the Gila scenarios, the number of circles filled in for each driver was determined based on the relative role each driver played throughout the entire narrative. The relative importance could also be determined more quantitatively through review and “voting” by participants who review the narratives.

The end result should be a document that describes your major drivers and why they are important for the future of the watershed and contains at least three scenario narratives. As previously mentioned, not every major driver will play a role in all scenarios. Box 3 provides an excerpt from a scenario narrative and includes Figure 5, which shows the relative importance of the 12 major drivers in the scenario.

Step 5: Exploring the Implications of Each Future

The final scenario narratives are a method to fuel discussion and promote action. While the scenario planning process itself is a powerful tool to bring stakeholders together to discuss the future, the narratives should vividly illustrate situations that pose significant questions in planning for the future. To prompt meaningful reflection of the narratives and ensure that the main points of the scenarios are not overlooked, it is useful to pull out the main questions yourself. In the scenario document we suggest you provide a list of “questions for discussion” throughout the document to ask how planning efforts could counter or improve upon the circumstances seen in each scenario. Examples of questions that a scenario could ask (excerpted from Scenarios for the Upper Gila Watershed, Mott Lacroix et. al., 2014):

- What types of agricultural production or management practices might be appropriate, assuming market demand, in the event of higher production costs for cotton due to drought and decreased water availability?
- How will joint intergovernmental efforts to remove/ manage invasive trees, if any, affect how local governments work cooperatively on other water issues?

- Where would people go if a 500-year flood hit the valley tomorrow?
- How many people could be sheltered by current emergency relief provisions?

These “questions for discussion” can then be used when presenting and distributing the final scenarios to stakeholders and local decision makers. Presenting the scenarios to a variety of audiences is your best opportunity to increase the exposure of the scenarios to the communities of the watershed. There are several ways to make the final scenarios visible and easy to understand:

- Provide printed copies of, or resources from, the final scenario document
- Visually represent the relationship between scenario events and their impacts using diagrams or graphic illustrations
- Disperse final scenario report via email, newsletter, or website
- Create an interactive website to explore the major impacts of the scenarios

From Scenarios to Planning

Scenario planning is not an end in itself, but rather a way to identify critical issues for a watershed within a larger planning context. The entire process of scenario planning is critical to building understanding and raising awareness among stakeholders about the multiple impacts and trajectories of today’s decisions and trends on the future of your watershed. Scenarios will enable you to systematically think through and evaluate how certain events and decisions will perform across a range of different plausible futures. By making the effort to create scenarios and exploring the questions they have raised you will be in a better position to make more informed decisions for the future. Regardless of how exactly you use the scenarios you have created, they will play a critical role in your overall watershed planning effort. By working together as a community to think systematically and creatively about an uncertain future you will build understanding and relationships that will improve decision-making.

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**THE UNIVERSITY OF ARIZONA
COLLEGE OF AGRICULTURE AND LIFE SCIENCES
TUCSON, ARIZONA 85721**

KELLY MOTT LACROIX

Senior Research Analyst, Water Resources Research Center

ASHLEY HULLINGER

Research Coordinator, Water Resources Research Center

MARK APEL

*Community Resource Development Area Agent, Cooperative Extension
Cochise County*

KATHRYN BANISTER

Graduate Research Assistant, Water Resources Research Center

BILL BRANDAU

*Graham County Extension Director & Agriculture and Natural Resource
Agent, Cooperative Extension Graham County*

SHARON B. MEGDAL

*Director, Water Resources Research Center & Professor/Specialist, Soil
Water and Environmental Science*

CONTACT :

KELLY MOTT LACROIX

klacroix@email.arizona.edu

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