

SCRIPT Responses to Climate Change: What You Need to Know

1. Title Slide

- a. Responses to Climate Change: What You Need to Know

2. Introduction

- a. Forests are shaped by climate. Climate is a major factor in not only where we find forests, but what types of forests we find there. The average temperature has increased in the United States and worldwide over the past century, accompanied by altered precipitation and other effects. As the climate changes, our forests will respond.
- b. Forests provide valuable resources and benefits, such as water, plant and animal life, recreation, and wood products. We manage our forests for the things we need and value. As the climate changes and forests change, it may become harder to maintain these values. This is why it is important that we begin preparing now.

3. Adaptation

- a. Climate change effects are already being observed, and these effects are expected to continue—and intensify—in the future. *Adaptation* means taking action to prepare for anticipated changes and respond to effects. Preparing human and natural systems for climate change involves assessing information about the vulnerabilities and risks associated with climate change and then choosing a course of action that best fits the management goals and the needs of the system.
- b. There is no single “right” way to respond to climate change, just as there is no single right way to manage resources. Natural resource management is diverse and will continue to be diverse with climate change.
- c. Some of the actions we are already taking to manage natural resources will likely help ecological systems adapt to changing conditions, even though climate change may not have been a specific consideration in developing those actions. However, it is risky to automatically assume that our current management plans and actions will work in a changing climate with warmer temperatures, altered precipitation patterns, and other expected effects. Given the potential challenges of climate change, it is important to act with *intentionality*, which means explicitly

considering and addressing the climate change effects that could impact our management goals and actions. Deliberately including climate change in our work makes plans and actions more robust. How well do current actions already address the expected effects of a changing climate? Are there other actions that we may want to consider?

- d. There are three different options that are helpful for thinking about climate change adaptation: *resistance*, *resilience*, and *transition*. Resistance and resilience emphasize management for the persistence of existing systems, and transition promotes system change.

4. Resistance

- a. The first adaptation option is *resistance*. Resistance actions improve the defenses of a system against anticipated changes, or directly defend the system against disturbance so that the system remains relatively unchanged.
- b. We may choose resistance as the adaptation option for a system when we want the system to essentially stay the same in the future regardless of climate change pressures, like being inside a protected bubble. This option could be most useful in high-value systems that may not be able to cope with disturbances and pressures from a changing climate. These systems may be economically, socially, or culturally valuable, or protected for specific values or characteristics. However, resistance actions do come with risks. The investment and resources to maintain the bubble around the system are likely to increase as conditions change. If we continue to resist climate pressures and changes over the long term, we could be setting the system up to fail if some critical threshold is reached. A large disturbance could cause the bubble to collapse and significantly alter the system. The disturbed system may grow back differently, be less productive, or may not provide the same values as the original system.

5. Resilience

- a. The second adaptation option is *resilience*. Resilience actions enhance the ability of a system to return to prior conditions after a disturbance. Although some degree of change may occur, the intent is for the system to return to a state similar to what it was before the disturbance.
- b. We may choose resilience as the adaptation option for a system when we want to increase the capacity of the system to absorb changes and recover from any disturbances. The system may undergo relatively minor changes as climate pressures increase, but a resilient system will

maintain its character into the future. Even though the future system may not look exactly like the original, it will be similar in composition and function. Resilience carries less risk than resistance because we manage the system to cope with some amount of climate disturbance. Risk still increases over time because the system may not be able to maintain the same character in a different climate.

6. Transition

- a. The third adaptation option is *transition*. Transition actions intentionally accommodate change, enabling a system to adaptively respond in a deliberate way. By encouraging a gradual and intentional transition, it may be easier to maintain important functions and values over time, even as the character of a system changes.
- b. We may choose transition as the adaptation option for a system when we want to facilitate changes that we believe will make the system better suited to future conditions. As time goes on, climate pressures on the system increase and the system may change. By anticipating likely effects on the system, we can shape our response to maintain desired functions and values even as the system is altered. Transition actions can take place in advance of climate change effects or in response to them. In the long term, transition may carry less risk because we are actively considering how a system may change and taking action to promote those changes.

7. Plans

- a. Now that we understand different adaptation options, how do we make them into on-the-ground actions? What are our management goals? How can we meet these goals in the context of a changing climate? It is important to understand the system and its vulnerability to climate change so that we can identify feasible adaptation actions that fit into management plans and activities.

8. FAR (Forest Adaptation Resources)

- a. Resources are available to help managers integrate climate change into planning and decision making. These tools can be adapted to different management goals and geographic locations.
- b. One adaptation process is from a guide called “Forest Adaptation Resources,” and despite the name, this process can be used for most any type of natural resource management. We begin

by defining management goals for a specific project or area. Next, we assess how the system is vulnerable to climate change. Based on these, we can evaluate potential challenges and opportunities from climate change. This helps identify adaptation actions that also meet management goals. The last step is to monitor the effectiveness of our actions. These steps walk managers through the process of integrating climate change into their work and help them create tailored, on-the-ground actions.

9. Mitigation

- a. The concepts of adaptation and mitigation are sometimes confused. Adaptation focuses on coping with the effects of climate change on systems. Mitigation focuses on reducing atmospheric greenhouse gases, such as carbon dioxide, that cause climate change. Systems may need help adapting to climate change, but they already play a crucial role in mitigation efforts.
- b. When managing ecosystems, we can incorporate mitigation of greenhouse gases as a management goal, similar to goals for improving water quality or providing recreation opportunities. Mitigation options for land management include reducing the amount of carbon emissions by storing or sequestering additional carbon in forests; providing renewable energy from biomass; or avoiding carbon losses from fire, mortality, or conversion.
- c. Forests in the United States absorb the equivalent of about 16 percent of the country's carbon emissions each year. Ensuring that forests are able to adapt to changing conditions will allow them to continue sequestering carbon dioxide and perhaps to store more carbon in the future.

10. Restoration

- a. *Restoration* is another management strategy. Sometimes defined in terms of restoring ecosystem function, restoration is most often defined as returning an altered system to its previous state with the intention of reestablishing the structure, productivity, and diversity that we think was originally present in the system.
- b. Restoration can be complementary to adaptation. This would occur for instance when we expect that restoring a degraded or altered system to its previous state will better enable the system to cope with the pressures of climate change. In fact, restoration without considering climate change could put a system at a higher risk if the restored state has greater vulnerability to climate change. Although the main focus here is on adaptation, it is important to understand

the differences among adaptation, mitigation, and restoration, and how they can complement each other.

11. Conclusion

- a. Managing our natural resources will become more challenging as the climate continues to change, but change, complexity, and uncertainty have always been part of managing natural resources. Climate change creates new challenges, but also new opportunities. It will require both skill and creativity to address the challenges and take advantage of the opportunities.
- b. There is no single “right” way to respond to climate change, and many different actions will be needed to address the challenges. Incorporating information about the vulnerabilities and risks associated with the changing climate is an important first step. From there, emphasizing actions that maintain flexibility and address the greatest risks may preserve the most choices for future managers, even as they help meet current management goals.
- c. What actions can we take to improve the ability of ecosystems to adapt to a changing climate? More and more people are helping systems adapt to climate change. Adaptation actions are tailored to each particular place and the values of the people working in that place, but they can provide useful examples on how to integrate new information and ideas into our forests and grasslands. Click on the map to see examples of adaptation in action.