WHAT: In this clip from the 2012 presentation "Climate information, drought, and adaptation," Dr. Pulwarty describes some of the implications of drought in the Four Corners region of the United States, a tribal region. He explains that since 2000 and 2009 the region has experienced increased temperatures that exceed a threshold of normal variation. He explains that increases in temperature, combined with decreases in rainfall (which he refers to as the "precip deficit") have impacted cultural traditions of the Hopi People and the nature of the landscape itself.

HOW: Dr. Pulwarty uses qualitative analysis (such as measurements or models of temperature and rainfall) to compare current and past climate for the Four Corner's Region. Dr. Pulwarty also gathers qualitative data: information that is comprised of non-numerical observations or personal accounts. The qualitative information collected from Hopi elders helps Dr. Pulwarty to put his numbers in the context of social impacts: what do these changes in climate mean for people who live in the region?

WHY: Dr. Pulwarty gathers his information only from trusted sources. For example, NIDIS is a national organization created by the government to promote objective collaboration between government agencies to help address drought-related issues. For anecdotal evidence, Dr. Pulwarty spoke directly to members of the Hopi community, whose nation is in the region he was studying. Using a first-hand source to hear about conditions rather than a second or third-hand source helps decrease the chance that details of the account may change as they are passed from source to source.

SO WHAT: Dr. Pulwarty states at the end of this clip, "Changes are going to happen. How do we help people preserve dignity...how do we help them get involved in decisions about their own lives?" Projects such as Dr. Pulwarty's address this concern by a two-fold approach: first, by providing information on the situation to a community at risk and, second, by receiving input from the local community, such as the Hopi, about what actions they believe should be taken. Including the local communities in the decision-making process helps to create adaptation plans that address their specific interests and needs.

BIO: Dr. Roger Pulwarty is an atmospheric scientist who researches the interactions between climate and society. He is interested in developing effective services to mitigate the social risks associated with climate change.
Drought in the Four Corners

TAKING THE REINS

Discussion Questions: Discuss these with a friend or record your thoughts in a journal
• What are some ways that you use water as an individual, and what are some ways that water is used collectively by your community?

Quiz Questions:

Quiz 1. Dr. Pulwarty describes changes that have occurred in the Four Corners Region since 2000 and 2009. Which of the following are changes that he mentions?

a) Decreased night time highs and increased river flow
b) Decreased length of growing season and decreased presence of birds
c) Increased wind events and increased tornado occurrence
d) Increased temperatures and decreased precipitation

Quiz 2. Why does Dr. Pulwarty state that collaboration is important in addressing drought?

a) If people from different groups work together, we can prevent drought from happening again in the future.
b) Allowing participation in decision-making regarding drought gives communities say in decisions that will impact their own lives.
c) Collaboration is not important in addressing drought.
d) Collaboration prevents people from ever disagree over water use in the future.

Glossary Term: Semi Arid Margin

A margin refers to a region defined by a given climate that borders a region of a different climate.

Semi-Arid regions are geographic areas that receive between 10-20 inches of rainfall per year. They receive more rain than deserts, but are still characterized by dry conditions and plant tolerant of limited water availability.
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JOURNAL ACTIVITY:

Materials: Notebook, paper, and pencil or dedicated computer file where you can keep your work. Using the following science journal template (a 7-part process) answer the question that follows:

- How has the climate where you live changed over the past 20 years?

1. Record the question above.
2. Without looking anything up, write down or sketch your answer to the question.
3. Ask family members, friends, or a teacher the same question and write down or sketch their answers.
4. What are the common ideas in the answers you've collected? Write or sketch the common themes/ideas.
5. Devise your own strategy for digging deeper (ask a scientist, check out university and government agency sites like NOAA or your local USGS page, go to the library, design and conduct an experiment, etc.) until you’re satisfied the answer makes sense to you. Consider changes based both on stories of people who have lived in the area for more than 20 years and measureable evidence, such as: average yearly temperature, average rainfall, occurrence of temperature highs and lows, snowfall, etc.
6. Summarize what is known and unknown about the subject of the question. Also note what evidence there is in supporting what is known and how the evidence was obtained.
7. Rate the answer you’ve come up with on a scale of 1 to 10, 1 being weak with lots of uncertainty, 10 being perfect.

FURTHER READING:

The complete PowerPoint from this presentation can be found on AGCI's website by searching “Previous Participants” for Roger Pulwarty.