

## CHAPTER SIX

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# Scenarios for the Future of Nitrogen Management in California

## Appendix 6.2 Background and Process

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## 6.2. Background and Process

Scenario analysis is a widely used process to create plausible stories despite uncertainties about the future. The process allows decision makers to better see and understand the implications of decisions that have or could have long term effects on their organizations or other interests. It also creates opportunities for different stakeholders to learn from an informative negotiation process among their diverse perspectives, and to suggest strategies for addressing problem issues.

The scenarios for this project were focused on the issue of N management in California agriculture. While N plays a central and critical role in crop and livestock production, N use has led to unintended consequences, among which are greenhouse gas emissions and ground water pollution. Stakeholder participants devised a set of scenarios as a means to create a big-picture view leading to a more comprehensive understanding of response options regarding California's N management and how these responses might affect farm profitability as well as environmental and human health outcomes over time.

Once a set of scenarios is created, it can be used to brainstorm and test potential responses to emerging conditions. Scenarios allow a proactive approach to planning; they allow stakeholders to consider options and prepare for actions in advance of a future event or situation. Further, scenarios can help identify early indicators and significant outliers.

In addition to the role scenarios can play in looking at the future, the California Nitrogen Assessment scenario process was designed to increase awareness and understanding across the assessment's diverse stakeholder groups, and to ensure that a wide variety of perspectives were heard. This process was facilitated by Gerald Harris and Jeff Barnum of Reos Partners, who began working with the assessment team in April 2010. Stakeholders were contacted that same month regarding their availability for future workshops, and given the opportunity to participate in pre-workshop interviews. Those interviews were conducted face-to-face and via telephone by Harris and Barnum in May 2010, and input from those interviews was used to shape the workshops.

During the first workshop session (June 9 and 10, 2010), stakeholder participants identified a number of important drivers that would be likely to influence the future use of N in California agriculture. The facilitation team captured a list of these factors and grouped them into seven major categories:

- *Technological change*
- *Changes in farming economics (profitability)*

- *Advances in N cycle understanding*
- *Awareness of the impact of N on human health and the environment*
- *Changes in the energy system aspects of agriculture*
- *Shifts in public policy related to managing N impacts in California*
- *Information creation and dissemination*

Through group discussion, participants then jointly agreed on two driving forces from this list of categories to serve as the primary variables for the four scenarios stories, following a general model from other scenario development efforts (Henrichs et al., 2010; Schwartz, 1996; Van't Klooster and van Asselt, 2006). The two attributes were chosen because they were simultaneously highly uncertain and highly important—changes in farming profitability and shifts in the public policy of N management. Participants agreed by a wide margin that these two factors are most uncertain and most important, and will thus most significantly affect how N-use decisions will be made in California agriculture over the next twenty years. Participants identified economic conditions that affect the viability of farms as vitally important, especially because of the wide diversity of different crops grown in California. They also agreed that public policy and regulation are central because they directly affect operating decisions and allow issues important to both government and consumers to be incorporated into agriculture. The extreme ranges of uncertainty of these two drivers help to differentiate the four possible scenarios from one another. The scenarios reside within the four quadrants created by these two drivers, with external forces driving changes in farming profitability representing the horizontal axis and shifts in public policy representing the vertical axis.

Many of the drivers discussed by the scenarios workshop group are similar to the drivers identified by the nitrogen assessment (see chapters 2 and 3). These include: global food systems, population and economic growth, regulations and incentives, land value, development of new technology, fossil fuel combustion, land-use conversion, and farm management (for both plant and animal systems).

After selection of drivers, the workshop participants were divided into four groups, with attention to representation of different stakeholder categories in each group. One or two members of the assessment project team were also present in each group as equal participants (i.e. they did not adopt particular leadership roles within the groups). Each group was assigned one of the four quadrants to use as a basis for developing a scenario storyline. Through group discussions, participants developed storylines in seven-year increments that were captured in notes written by one or two group-selected members on flip charts. At the end of the multi-hour

session, each group took a turn to orally present its scenario storyline to the entire workshop group, with workshop facilitators taking notes. The facilitators, with input from the assessment team, then used their own notes plus each group's notes to write out scenario storylines in text form. Members of the assessment team checked the storylines for plausibility and consistency.

In September 2010, stakeholders reconvened at a second workshop to review the core ideas of the four scenarios previously developed, discuss any disagreements or alternative interpretations for the scenario storylines written by the facilitators and assessment team, identify gaps and additional drivers and outcomes, and suggest any necessary revisions. The group also discussed how the scenarios affect policy and agricultural practices (see Section 6.6) and possible research topics for the assessment which would provide needed information for varying audiences.

Members of the assessment team made final edits to the storylines based on the second workshop and re-checked all storylines for plausibility and consistency. This process led to some simplification and small changes in specific details contained within the storylines, but did not result in any fundamentally different outcomes for any of the four scenarios.

## References

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