Increasing the use of climate-related information: Experiences with decision makers in the Agricultural Sector

Dave Changnon
Northern Illinois University
A changing agricultural picture: “Toto...We’re not in Kansas anymore!”

- The family farm is now the corporate farm where “precision” farming decisions are made on a daily basis to enhance output and manage risk.
- Today’s international grain market influences decisions at all scales.
  - National strategies—export/import planning and purchases/sales
  - Agribusinesses—operational planning (future planting/hybrids based on current yields)
  - Farmers—marketing strategies for sales/storage
Background on Ag-Climate Relationship

- NWS cooperative station network has been used over the past 100 years to examine and understand relationships between weather and agriculture (e.g., plant development, crop yields, etc.).
- Research conducted by government agencies (e.g., USDA, NOAA, etc.), academia (e.g., land grant institutions), and private sector meteorologists has led to the development of sophisticated weather-crop yield models and other tools useful to manage weather risks in agriculture.
- However, many weather-sensitive users still lack ways to incorporate weather/climate information into their decision processes (Dutton, 2002).
Flows of agricultural products, weather information, and transfers of financial risk. (Button, 2002)
Today’s ag-related decision processes: What should be known

• Their issues are *complex*—non-weather factors are often more important than weather factors in decisions (e.g. cost of fuel, hybrid choice).

• We (parts of the weather enterprise) must *sit down* with these agricultural decision makers and *learn* more about *specific issues* facing them and how we could “enhance” or add value to existing decision processes.
What should be known...cont.

- Those in agriculture make many decisions (e.g., seasonal agricultural practices) that are based on “uncertain” information and they understand that weather information (e.g., short-term to seasonal outlooks) are associated with uncertainty.

- We need to understand how and when they want “weather/climate uncertainty” communicated to them (e.g., types of products).
Applied Climate Projects: A “User-Centered” Approach

- **Assessment of Users:**
  - *What* do we need to know to work successfully with them?
  - *Who* are potential weather-sensitive decision makers?
  - *Where* can these “users” be found?
  - *How* do I go about approaching them?
Applied Climate projects...

• Assessment... *where are they?*
  – Review the literature.
  – Contact private/public sector organizations that *may* be impacted by weather/climate (e.g., USDA, crop-hail insurance, etc.).
  – Contact NCDC, the Regional Climate Centers, or RISA groups who are or may be involved with agricultural users.
Applied Climate Projects...

- Assessment...*what to ask*?
- Develop a questionnaire to find out:
  - How and when are decision makers impacted by weather and/or climate?
  - Is information currently incorporated into operational decisions and/or planning activities? What is the *decision* lead time?
  - Are they aware of available climate information and products (e.g. seasonal forecasts)?
  - Do they understand how to use climate information in their decisions?
Applied Climate projects...

- Questionnaire ideas continued:
  - How would *they* like climate information presented (e.g., dissemination method)?
  - What is the “value” of improved decisions to the organization?
  - What “non-climate factors” are involved?
  - What is the “end product” (e.g., output that tells them what hybrid to use, estimates crop yields, or when to spray specific fields)?
Applied Climate Projects...

- Assessment...*what do I do with this information?*
  - *Identify* the “concept” or weather-sensitive issue(s) facing the organization.
  - *Develop* a problem statement (include objectives of the project).
  - *Communicate* with the decision maker—is everyone on the same “page”!
Applied Climate Project...

- Integrating climate information into a user decision process (model development).
  - Enhance existing climate information.
  - “Two-way” communication is key to success.
  - Determine “potential value” associated with use of information in the decision.
  - Test and refine decision process (must deal with changing uncertainties in all factors).
  - Dissemination of results—“not just one-stop shopping!” Project doesn’t end when the final report is handed to the user!
Assessing the Success of an Applied Climate Project

- Are weather-sensitive organizations really using the model/information?
- What are hindrances to use? Can they be overcome?
- What are benefits from use (e.g., better/earlier estimates of corn yield)?
- Have others in the organization used the model/information (or modified it)?
Case Study 1: The surprising 2004 crop yields in the Midwest

- A highly unusual summer produced *record high yields* that were under-predicted.
- Crop-weather yield models need to incorporate *real-time sunlight* and other conditions not currently incorporated.
- The Global Earth Observation System of Systems (GEOSS) could provide the needed sunlight information.
- Better government/business strategies are possible and major monetary outcomes can be accomplished with improved yield models.
Case Study 2: The soybean rust risk in the Midwestern U.S.

- Soybean rust has caused enormous losses to soybean crops in South and Central America.
- Soybean rust introduced into many parts of the Southeast U.S. during Hurricane Ivan’s land fall in September 2004.
- It over winters in Florida kudzu.
- Can it migrate to the Midwest?
- Weather models to forecast rust migration are needed so that farmers can spray fields.
Lessons learned from experiences with agricultural decision makers:

- The weather enterprise must work *closely* with users in this changing world. Frequent communication between climatologist and user is an important key to success!
- Those involved should be “climate savvy.” We should understand the value of weather information (assess benefits of use) and develop relevant “tools” for agricultural decision makers.
- Weather/climate factors must be separated from non-weather factors involved in the decision process (e.g., current supply of corn).
More lessons learned...

• Take time to *learn* about users (informal weekly lunches).

• Let the “user” dictate:
  – *what* they want,
  – *when* they want it, and
  – *how* they want it communicated to them.

• Weather/climate “products” need to change as the commercial world evolves. Think beyond traditional climatology!
Demonstrating Value in Climate Information

Climate Forecasts & Information

Interpret & Add Value

Weather Sensitive User

Information Gap

Existing Climate Information

Need for "New or Different Climate Product"

Enhanced Climate Information and Predictive Models

Weather Related Concern

Student Projects & Faculty Research