

Northern Research Station

Rooted in Research

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Leveraging Generative AI for Landscape Planning

Successful landscape planning projects often incorporate input from local community members who live and work in the project area. Most people need to be able to see what a proposed change might look like; words are not enough. Images can provide a useful starting point for discussion among community members and planners, but community values and goals can be time-consuming to subsequently incorporate into draft visualizations and plans. Even when landscape architects can render visualizations for communities to use in planning, this process often requires meeting with stakeholders, developing visualizations, getting feedback on visualizations, and editing them: a cycle that might occur several times before images that represent stakeholders' viewpoints are effectively created.

Now, generative text-to-image tools that use artificial intelligence (AI) can create images from keywords. This transformative technology has the potential to improve the community engagement process in landscape planning and help ensure that these projects meet the community's needs quickly without requiring extensive graphic design knowledge.

In a case study, social scientist Kristin Floress from the Forest Service Northern Research Station and her colleagues from several universities recently developed a method for collecting community input using images created from generative AI and quickly incorporating it to adjust the images and resulting plans. They developed this method for the Diverse Corn Belt project, a U.S. Department of Agriculture (USDA) initiative that aims to explore the possibility of making communities in the Midwest more resilient through diversifying crops, markets, and landscapes.

PUBLIC BENEFITS

By making it easier to capture and quickly incorporate input from local community members in landscape planning projects, planners can use generative AI to help ensure that proposed projects consider multiple factors and meet local needs in real-time.



Example of an image generated using AI with sticky notes used by community participants to share their feedback during a workshop. Forest Service photo by Kristin Floress.

Five-Step Method

The method that Floress and her colleagues developed follows five main steps:

- 1. Select the text-to-image tool:** Several text-to-image tools exist, such as Midjourney, DALL.E 2, and Adobe Firefly. The research team selected their preferred tool, after testing different options, because the generated images better represented their landscape.
- 2. Generate visual representations of the project:** Prior to their participatory sessions, the team generated images of five different diversified agricultural systems identified in the Diverse Corn Belt project. These included 1) extended rotation with 3 or more crops over 3 years, 2) perennial pasture or forage and perennial bioenergy crops, 3) horticultural food crops, 4) integrated livestock and grazing, and 5) agroforestry.

3. Host participatory sessions: The research team hosted workshops for community members in Illinois, Iowa, and Indiana. Community members participating in these sessions were considered experts on local and agricultural landscapes and included farmers, agricultural landowners, consultants, educators, researchers, government employees, and nonprofit employees. These participants were asked 1) what about the pictured system will you keep and 2) what about the pictured system will you change? Participants summarized their answers in a few keywords on sticky notes.

4. Analyze data: The researchers summarized the keyword data on the sticky notes. In the first two participatory sessions in Illinois and Iowa, researchers also analyzed the transcripts from the meetings. In the last participatory session, the researchers only analyzed the keywords on sticky notes to save time.

5. Generate a new set of images based on stakeholder input: The research team used the data collected from participants to create a new set of visuals that incorporate the participants' input.

Saving Time

While the data analysis process for the first two participatory sessions, in Illinois and Iowa, was thorough, the process took over a month. To refine this process for the Indiana participatory session, the research team grouped similar sticky note responses together to create themes—a process that only took 10 minutes—and then generated new images within an hour. This faster process made it possible for new images based on participant input to be generated within the same day.

Applying AI

This method provides a feasible way to leverage AI for landscape planning and quickly gather and incorporate community feedback within a single workshop day. While this particular case study with the Diverse Corn Belt project showcases the use of generative AI for community engagement in agricultural projects, this method would also work for other types of projects, such as forest management projects. Ultimately, this method will make it easier and faster to incorporate community input into landscape planning processes.

KEY MANAGEMENT IMPLICATIONS

- Images can effectively generate discussion and input from community members during the landscape planning process.
- Generative AI can be used to create images ahead of community workshops to prompt group discussions.
- By using keywords generated by group members that convey what they like and would change about each image, planners can incorporate community feedback into AI prompts and quickly conduct iterative discussions.

PROJECT LEADS

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Jenna Zukswert is the author of this science brief.

FURTHER READING

Awashra, I.; Thompson, A.W.; Floress, K.; Arbuckle, J. G.; Church, S.P.; Genskow, K.; Prokopy, L. S.; Rui, Y.; Tesdell, O. 2025. [Generative AI text-to-image for community participation in landscape planning](https://doi.org/10.1016/j.landurbplan.2025.105464). *Landscape and Urban Planning*. 264: 105464. 13 p. <https://doi.org/10.1016/j.landurbplan.2025.105464>

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