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INFO NOTE

Putting People First: Applying Human-Centered Design for Improved Agro-Climatic Bulletins in Vietnam



Nguyen Mai Huong, Vu Thi Bich Ngoc, Le Thi Tam, Luong Van Lam, Manh Lam Tuan, Pham Thi Kim Dung, James Giles, Cornelis Swaans

Key Messages

- There is a critical need for Weather and Climate Services (WCS) that are designed with—not just for—farmers. Human-Centered Design (HCD) helps to develop services that are grounded in local context, co-created, and delivered through accessible and trusted channels.
- Iterative prototype testing of Agroclimatic Bulletins (ACBs), a WCS for farmers in Vietnam, helped to accelerate the improvement of the ACB development process, its content and format, while it provided insights on mechanisms and tools for receiving user feedback.
- Female farmers consistently rated the ACB higher, valuing its clarity, attractive visuals, and usefulness in supporting their farming knowledge, while male farmers were more critical, focusing on forecast and advisory accuracy, timeliness, and the need for more detailed technical instructions.
- The HCD approach highlighted the diverse needs and preferences among users based on their personal characteristics, objectives, and motivations, underscoring the importance of paying attention to these when designing products & services.
- While aligning WCS with institutional capacities and multi-level collaboration, sustained improvement depends on keeping users at the center of the design and decision-making processes, thereby ensuring their continued relevance, adoption, and impact.

Weather and Climate Services for Vietnamese Farmers

Weather and Climate Services (WCS) are vital for managing risks from daily weather variability to long-term climate change, helping farmers make timely agricultural decisions. In the Mekong River Delta, the Agro-Climatic Bulletin (ACB) has become a widely used public service among smallholder farmers, providing seasonal, monthly, and 10-day forecasts and technical advisories tailored to farming activities (Swaans & Le, 2024). By guiding decision making during planting, fertilizer application, pest & disease control, irrigation management, harvesting etc., ACBs support greater resilience, reduce input cost, and contribute to higher crop yields.

ACBs have been developed since 2020 through collaboration between Vietnam's Department of Crop Production (now the Plant Production and Protection Department) and the Alliance of Bioversity International and CIAT under the IKI-funded DeRISK SE Asia project. From 2022 to 2024, ACBs were further adapted and scaled through the CGIAR Asian Mega-Deltas initiative, with additional financial support from the Ministry of Agriculture and Environment (MAE) to expand their use beyond the project's original scope.

Among the three types of ACBs, the 10-day ACB is the most recent and more frequently used, offering more practical advisories for farming practices based on short-term weather forecasts. These are produced by local Technical Working Groups (TWGs), including provincial experts in agriculture, hydrometeorology, irrigation, and related fields. Using a PowerPoint (PPT) template, ACBs are converted into digital images or scripts and disseminated through multiple channels, including loudspeakers, community meetings, agricultural websites, and especially the Zalo mobile app, the most common platform for farmer outreach.

The Agro-Climatic Bulletin process

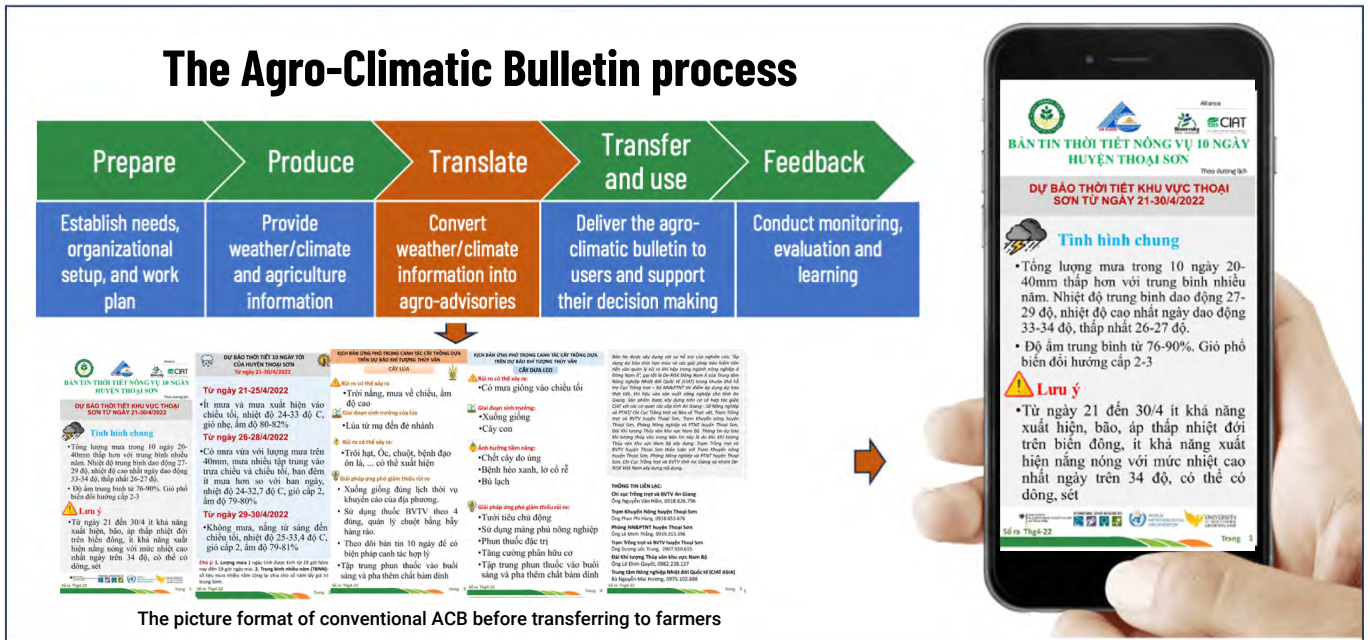


Figure 1. The ACB development process includes five participatory steps. During “Translation” (red), weather/climate and agriculture information is being converted by TWG members into advisories for the ACB. The bulletin is then shared to farmers in picture format (ACB pages) via smartphone Zalo app

Figure 1 depicts the ACB development and dissemination process. It is based on CIAT’s Local Technical Agroclimatic Committee (LTAC) approach which was originally developed in Latin America (CIAT, et al., 2022). The ACB process includes five participatory steps: Prepare, Produce, Translate and Use, and Feedback. The steps are similar for the different types of ACB, with the difference that the 10-day ACB is produced every 10 days and mainly disseminated digitally (through Zalo); hence, the development process is much faster with the ACBs usually produced and disseminated through virtual interaction among members of the TWG. The users’ feedback is collected at the end of the season through surveys and discussed during review meetings by the TWGs to monitor and evaluate the implementation of ACBs. While this feedback is helpful, the seasonal surveys provide an incomplete picture of farmers’ experiences, especially in relation to the 10-day ACBs. The lack of in-depth user insight limits the ability to effectively improve the ACB design.

This Info Note presents the results and insights of the application of a Human-Centered Design (HCD) approach in Vietnam to improve the 10-day ACBs by making them more user focused and meet the needs of both farmers and Technical Working Groups (TWGs).



Photo: CIAT

Improving the Agro-Climatic Bulletin through Human-Centered Design

Existing WCS are often top-down, technically complex, and misaligned with farmers’ realities (Giraldo Mendez, 2023). In contrast, HCD places people at the center of problem-solving (UXdesignInstitute, 2023). Widely used in mission-driven innovation and increasingly in agricultural research-for-development (Steinke, et al., 2022), HCD offers a valuable pathway for user-centered WCS by tailoring tools to users’ needs, tasks, and decision-making processes (Ortiz-Crespo, et al., 2021).

Following the HCD framework, a flexible, iterative five-phase process was identified to improve ACBs in Vietnam:

- (i) Identifying key design issues of the conventional 10-day ACB (Scope)
- (ii) Gathering insights from farmers and TWGs based on their use of the conventional ACB (Explore)
- (iii) Defining design challenges and creating prototypes for the redesigned and improved ACB (Create)
- (iv) Testing the improved ACB prototype with farmers and TWGs (Validate)
- (v) Refining, implementing and scaling the improved ACB through continuous feedback (Implement)

The study presented concentrates on the first four phases and involved internal reflection by the Alliance project team and discussions of the team with rice farmers (18-60 years, both men and women), and TWGs from An Giang, Hau Giang, and Soc Trang provinces¹ between November 2023 and September 2024.

¹ Effective July 1, 2025, Hậu Giang and Sóc Trăng provinces have been merged into Cần Thơ City under Vietnam’s administrative restructuring.

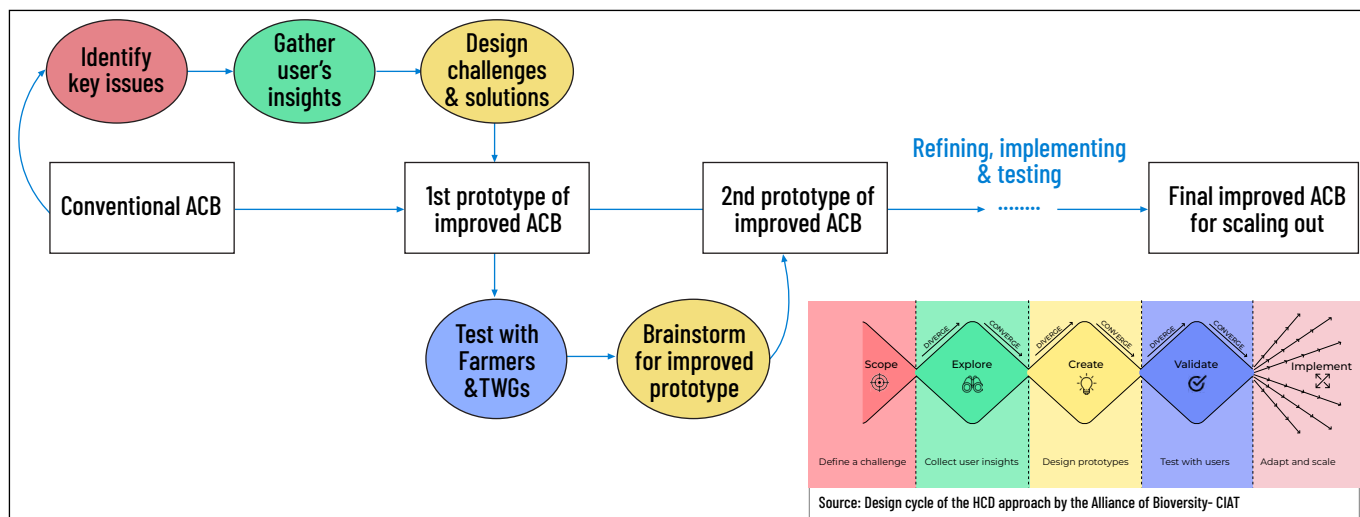


Figure 2. The HCD process as applied in the context of ACBs in the MRD, Vietnam

ACB Design Challenges and Solutions

The initial steps focused on reviewing existing data and user behavior analysis to identify challenges in developing and using the current or conventional ACB.

- First, the Alliance project team assessed the conventional ACB by reviewing reports and past ACBs to identify gaps related to four aspects that are critical for HCD: the ACB development process, its content, format, and user feedback. Additional observations of TWG members developing ACBs, as well as farmers reading, responding to, and applying ACB advisories in Zalo group chats and field practice, yielded deeper insights into usability issues and barriers.
- Second, before, during and after the 2023-2024 rice Winter-Spring season, the project team conducted three trips and held a total of 6 Focused Group Discussions (FGDs) in An Giang Province. These consisted of separate male and female FGDs in 3 communes, with a total of 54 farmers (29 men and 25 women). Farmers shared their

experiences with and views on the previous season's ACBs content, format, and feedback mechanism; in addition, 7 TWG members contributed insights on their experiences with the overall development process of the 10-day ACBs. Open-ended questions in FGDs helped uncover both explicit and implicit users' challenges.

Putting the users in the center of the design process, the project team summarized the identified design challenges, which were then framed as "how might we..." questions to generate potential solutions based on insights and responses provided by the users (see Table 1). For example, for the issue of "too many manual steps required" in the ACB development process, the team raised the question "How might we reduce the number of manual steps in the development process?" These questions then drove the development of potential improvements and new features for the enhanced ACB.

Table 1. Expert usability review of the ACB

Conventional ACB	Design challenges	Solutions
	Time-consuming process	Instead of the TWG having to draft new ACB pages for each bulletin, develop ready-to-use cards (ACB pages) that can be selected and adapted by the TWG when developing a bulletin
	Too many manual steps	Utilize the layout section of the PPT program to store all commonly used cards for easier selection by the TWG when drafting the ACB
Development process	Not possible to document advisories shared	Past advisories (cards) can in principle be stored in the PPT template. These can then be reviewed and analyzed when needed. The advantage of a standard template for advisories is that it creates opportunities for developing a database based on past advisories for easier analysis and which can then be used to inform future advisories integrating information from key variables
	When traveling, TWG members tend to share ACB screenshots from smartphones instead of exporting PowerPoint, resulting in low quality images.	This only happened in a few TWGs, but this could be improved by providing some training or creating a simple step-by-step guide (or short tutorial video) showing how to export slides as high-quality images from PowerPoint on smartphone.

Conventional ACB	Design challenges	Solutions
Content	Repeated recommendations across ACBs each season have made farmers feel bored with receiving the same messages.	The TWG reviews the previous ACB content and updates it to reflect current local conditions at each crop growth stage, helping reduce the sense of repetition for farmers.
	TWGs manually enter information on weather, risks and advisories with limited time before exporting the ACBs, leading to errors.	Pre-developed 'cards' with easy-to-use templates that can be adjusted or complemented with additional information by the TWGs based on local conditions can help to reduce mistakes.
	Climate information is lengthy and confusing, using terminology which is not always clear to the user	A specific 'weather-card' providing a table of daily weather information with simple data and visuals. A "hazard card" is designed to present weather-risk information and associated crop impacts tailored to specific cropping stages.
	Lack of detailed guidance on pests & diseases	For each common issue, especially pests and diseases, the ACB should provide: 1) information to help identify and confirm the key issue (e.g., which pest or disease); and 2) a detailed step-by-step guide on how to address the problem.
Format	Layout is not attractive to farmers	Create new ACB templates with more attention to style and visualization
	Font size and format are inconsistent	Create fixed-format layouts for each card/page of the ACB bulletin
Feedback	Tracking farmer feedback on each advisory is difficult.	Guide farmers on how to react to practice cards using the available emojis in the Zalo group chat

The design challenges and proposed solutions were based on a reflective process of the Alliance project team and user feedback from both farmers (women and men) and TWG members. Complementing user insights through end-of-season reviews and a previous user-needs assessment (Luong, et al., 2024), the 10-day ACB development process was enhanced with two new features: (1) A set of ready-to-use Advisory cards was developed, standardized and integrated in the layout section of the PPT template of the ACB to save time from manually drafting advisories and to enable easier documentation; (2) A daily Weather card was designed with a simple table and visualized icons to make the text less dense. Regarding the improvement of user feedback, an instruction was sent to farmers in Zalo groups to guide farmers on how to use Zalo emojis to rate the relevance of each card of the ACBs.

Figure 3 shows the improved ACB PPT template on the TWG "computer screen" (left). On the "computer screen" and on the right, the figure shows pre-made advisory cards which are stored in the layout section of the PPT, which the TWG can access through a drop-down list with options for easy selection and editing. A daily weather forecast template with selectable icons has also been added. The updated design—featuring vibrant colors, images, and visual icons—enhances effectiveness while saving TWG's time in developing ACBs.



Figure 3. New features of the improved ACB prototype were integrated into a PPT template of the 10-day ACB

Pilot testing of the improved ACB

The first prototype of improved ACB was piloted in 8 districts of An Giang, Hau Giang, and Soc Trang provinces during the 2023-2024 rice Winter-Spring season and the 2024 Summer-Autumn season. User experience was tested among the same groups of farmers from An Giang Province that assessed the conventional ACB in the previous section. Content usefulness was evaluated in all three provinces. At the end of the two seasons, 100 farmers (51 women and 49 men) and 27 TWG staff (11 women, 16 men) reflected on the new features of the improved ACBs and their application via FGDs and KIIs.

Farmers' evaluation and feedback

User experience

Farmers, both male and female, in An Giang province were asked to validate the improved ACB based on user experience. Farmers compared the first improved prototype with the conventional ACB in gender specific FGDs sessions using selected 'scales' from the User Experience Questionnaire tool (Schrepp & Thomaschewski, 2023):

- **Trustworthiness of Content:** Subjective impression that the information provided by the product is of good quality and reliable.
- **Intuitive Use:** Subjective impression that the product can be used immediately without any training or help.
- **Timeliness:** The delivery of the product is on time.
- **Quality of Content:** Subjective impression that the information provided by the product is actual, well-prepared, and easy to understand.
- **Visual Aesthetics:** Perception that the graphical user interface of the product looks beautiful and appealing?
- **Usefulness:** Subjective impression that using the product is beneficial.

These were presented to farmers as spider diagrams to rate their subjective satisfaction with the ACB on a scale from 0 to 5 (see Figure 4).

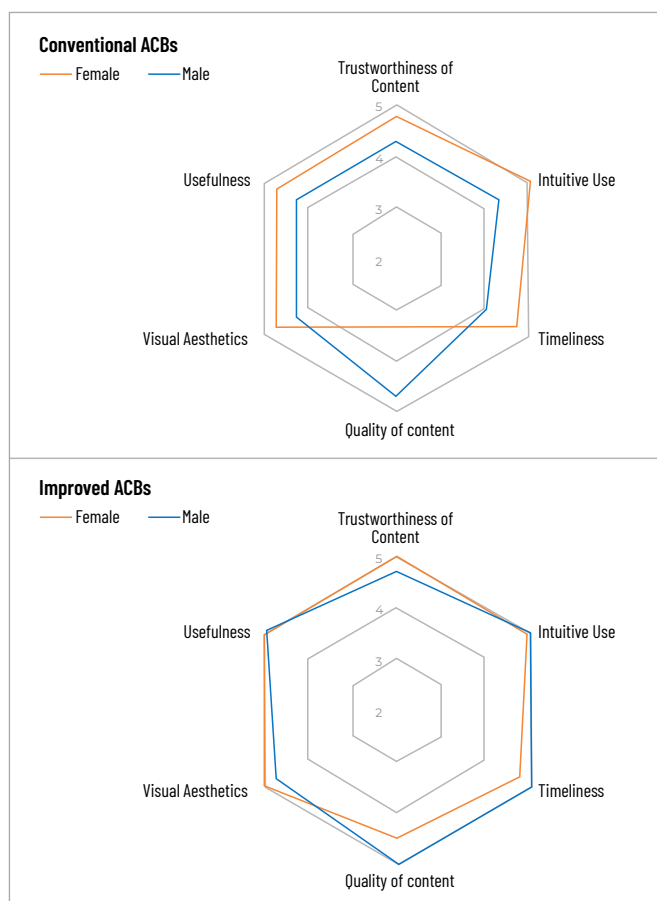


Figure 4. Farmers' evaluation of conventional ACB and the improved ACB

Overall, farmers were very generous in evaluating both ACB versions, with the lowest score being 3.3, and the highest being 5. Still, there were some interesting observations. The spider diagram shows a small but consistent increase in scores across all scales for the improved ACB. The increase was slightly more significant among men who were somewhat more critical about the conventional ACB compared to women, except for "Quality of Content" which they scored relatively high (score 4.8). Hence, it was interesting that women valued this aspect relatively low for the conventional ACB (score 3.3), but with a significant increase for the improved ACB (score 4.7). This was attributed to the improved bulletin being more relevant to their local area and situation and its recommendations being more specific in terms of instructions, an observation which was supported by men as well. Men expressed the biggest increase from conventional to improved ACB in terms of timeliness (from score 4 to 5). They were slightly more critical about delayed distribution of the conventional ACB.

Other improvements were less striking, although discussions provided further insights. Both women and men considered the improved ACB more eye-catching due to clearer visuals, better colors, and the inclusion of more pictures. The bulletin's intuitive use and usefulness further improved, with perfect scores for the improved ACB. While some concerns about the accuracy of weather forecasts remain, the overall feedback indicates that the improved ACB is seen as highly valuable and useful for making informed farming decisions. The content's trustworthiness and intuitive use were already valued highly for the conventional ACB, and even valued higher for the improved ACB, due to the official information sources from government agencies and the language simplicity.

Both male and female farmers viewed the first prototype as a significant improvement compared to the conventional one; male farmers prioritized the bulletin's practical value and timeliness, while female farmers were most concerned with the content's direct relevance and visual presentation.

Content usefulness

Besides overall feedback on the quality and design of the improved ACB compared to the conventional ACB, farmers also provided specific feedback on the content of the improved ACB, i.e. on the weather and advisory cards, while information was collected on the use of 'emojis' for feedback on information shared with farmers in Zalo messenger group app.

Suggestions for further improvement of weather and advisory cards emphasized the need to add more detailed and crop growth specific advisories, and more recommendations and instructions on advanced farming practices and use of pesticides, etc. (See table 2)

Table 2. Farmer feedback and ideas for improvement on the content of weather and advisory cards of improved ACB

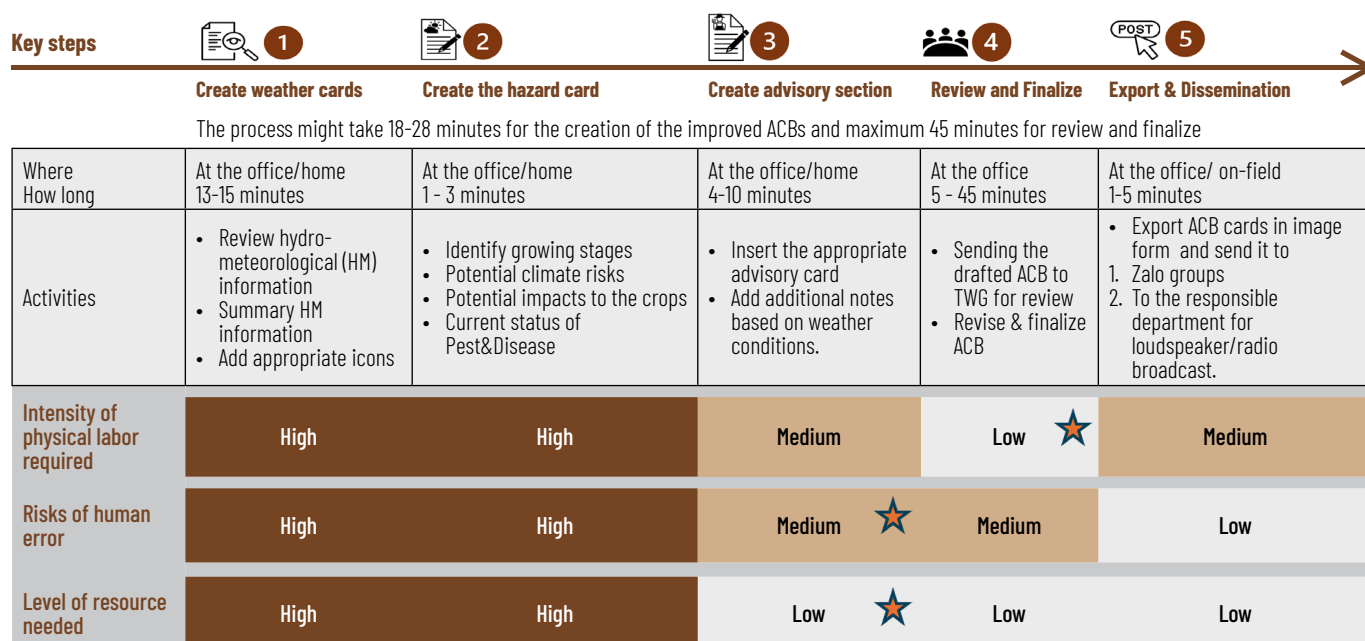
Feedback on content	Ideas for improvements
Weather information: reported accuracy is 70% - 100%.	No need for change; farmers are happy with this accuracy level.
Need more downscaled (commune-level) information on extreme weather, rain probability, amount of rainfall, humidity, and hydrological forecast (especially at sowing stage in drought-prone areas).	This depends on the provincial forecast capacity, which can be improved with capacity-building activities and/or technology investment.
TWGs generally use pesticides' active names as they are not allowed to use brand names. But farmers are often only familiar with some common brand names. Farmers face the same issue for fertilizer applications.	Add an example of a brand name/image of a suggested pesticide or fertilizer that is allowed to be used in the locations.
Farmers face challenges with terminology of Hydro-meteorology information.	Use simple words instead of technical terms whenever possible; provide farmers with materials like terminology glossaries and training on how to read and use the ACB information effectively.
Need more tailored advisories for different growth stages.	Develop advisory cards per cropping stage if relevant.
Need more information on rice varieties to choose the most suitable one for the specific conditions of the upcoming season.	Provide more information on characteristics of different rice varieties in the ACB or as complementary materials for farmers to decide on which ones to plant before each season.
Need images of and advisory for current practices (e.g. machinery use).	Update machinery application recommendation to advisory cards.
Instructions missing on how to apply advanced farming practices (e.g. low-emission farming practices).	Embed links to online resources for more updated information, detailed instructions; provide training on advanced farming practices.

*Responses of women and men were combined since they were very similar.

Observation of Emoji feedback from 1,935 farmers in 17 Zalo-groups showed mostly positive reactions (315 'Excellent,' 27 'Interesting,' 2 'Not relevant') but overall low engagement. This suggests that emojis alone, even with an instruction guide, is insufficient to capture farmers' true opinions. It suggests that stronger facilitation and clearer guidance are needed, along with more interactive feedback mechanisms such as reviewing shared information with TWG members and conducting end-of-season feedback sessions with farmers and user groups.

TWGs' reflection and feedback

To better understand the 'gains' made in the development process of the improved ACB, the workflow of TWGs was assessed. This included observing TWG members as they performed the improved ACB development process while they shared their experience (see Figure 5). The observed process focused solely on drafting the ACB using the improved template; it does not cover the steps of collecting weather and agricultural data. The time for review and finalization of the ACB was estimated by the TWG.



★ = Substantial improvement due to the new features of the improved ACB compared to the conventional one.

Figure 5. The workflow of TWGs for the development of the improved 10-day ACB

Overall, the improved ACB - with support of predesigned weather and advisory cards - helps TWGs to streamline the production of the 10-day bulletin, reducing both time and manual labor compared to conventional ACBs. For example, drafting a conventional ACB takes more than an hour on average, whereas drafting an improved ACB requires only 18-28 minutes, provided that all necessary data such as agricultural, weather, and irrigation data are available. The time of the review process varies from 5 to 45 minutes, depending on the actual situation, e.g., unexpected changes in weather or complicated pest and disease outbreaks that require specific advisories and careful review; while the features of the improved ACB may not directly affect this process, predesigned templates may help TWG to focus on problematic issues and therefore increase the overall quality of the advisory. Based on the FGDs, the TWGs also recognized several other improvements, such as the ease of use and the uniform and attractive design, which made it look more professional in their view.

TWG members were also asked to indicate where the improved ACB brings the most substantial gains to the development process compared to the conventional ACB (see "stars" in Figure 5). First, in the create advisory section, the improved ACB provides predesigned advisory cards for selection with clearer templates and well-defined content. This reduces mistakes from adding information manually and reduces the effort, time, and resources required by TWG members since they can simply add an advisory card in the

layout section based on local conditions for re-use instead of having to develop 'cards' each time from scratch. Second, since a set of advisory cards is predesigned, the TWG can review it and revise (where needed) in the PowerPoint format before the start of the season. Supporting of what was mentioned before, the structured layout and standardized content of 'card' templates minimize chances of overlooking mistakes during the review and finalization process.

The TWG members also reflected on the challenges they faced in each step of the development process of the improved 10-day ACB (Table 3). The key challenges include manual entry of weather data is time-consuming and error-prone; locating and selecting advisory cards becomes difficult as their number of cards grows; seasonal changes require updating or creating new advisories; and exporting cards, especially during travel, can be inconvenient.

These challenges can be addressed by automating weather data integration, simplifying weather cards by grouping consecutive days with similar conditions, introducing color-coded advisory sections, providing training on PowerPoint master slides, offering simple guides for seasonal updates, limiting cards to the main risks, and creating step-by-step instructions or tutorials for mobile exporting. In addition, the TWGs proposed enhancements such as providing more specified advisories associated with risks in each crop growth stage and adding advisory cards for local pests, diseases, and management practices.

Table 3. Validation of the development process of the improved ACB by TWGs

Steps	Challenges	Suggestions
Create weather cards	The manual input of weather forecast data in the daily weather table is a time-consuming process that is sensitive to errors.	Simplify weather cards by grouping consecutive days with similar weather conditions. Need to develop a more effective, automated mechanism to integrate forecast data into the weather card.
Create warning card	No challenges mentioned.	n/a
Create Advisory Section	As more advisory cards are developed, it takes increasingly more time to locate and select a specific card from the layout section.	Develop color-coded sections for different advisory cards, based on type of practice, crop, growth stage, and/or purpose (e.g., low emission), to facilitate selection.
	Adjusting advisory card information is more complicated as it requires editing the 'master' slides.	Improve skills on using PPT for TWGs to more easily adjust/add 'master' slides.
Review and Finalize	Due to the change of weather and hydrological conditions each year, the pre-made advisory cards need to be adjusted, or a new one created, to better tailor recommendations to farmers.	This is a must-do step to ensure ACB advisories are distinctly tailored to the local situation each season; a simple instruction guide or training can be provided in the process of adjusting and/or creating new advisory cards.
Export & Dissemination	With multiple risks identified, an ACB may have too many cards.	Only provide advisory cards for the main risks and practices.
	Exporting PPT templates to PNG-format requires a computer, which is inconvenient when traveling.	Training and/or creating a simple step-by-step guide (or short tutorial video) on how to export ppt templates on the phone.

Next steps

Following the HCD principles, the team has integrated users' feedback into a final version of the improved ACB for testing in practice. The information gaps identified by farmers were addressed, e.g., by including growth-stage specific recommendations for required advisory cards, details on farming techniques, market information. Additional advisory cards were developed to cover a wider range of crops, pests, diseases, and farming practices and they are regularly updated to align with changing crops and weather conditions during the development of ACBs. At the same time, TWGs' insights and suggestions for refining the templates and the ACB development process were applied to better fit with their needs. Other suggestions, such as enhancing the granularity of weather forecasts to the commune level, will be discussed with governmental partners to inform and support more systematic changes at the institutional and policy level in the coming years.

Applying HCD principles to improve the 10-day ACB provided several key insights. It emphasized the need to consider gender differences when designing digital tools, while also acknowledging the similarities between men and women. The process further revealed that individual farmers vary widely in their goals, needs, and challenges. These highlight the diverse ways farmers engage with the ACB and the importance of adapting its information to their unique needs and circumstances. In future evaluations, we plan to pay more attention to these differences and enhance the way we communicate and disseminate ACBs with various user groups.

In line with the proposed changes for the improved 10-day ACB, we continued to further digitize the ACB development and dissemination process by developing an ACB builder platform. This platform intends to automate data integration and development of weather, hazards and advisory cards, while maintaining the participatory element and critical role of the TWGs to select and adapt, and disseminate relevant advisories based on the actual weather forecast and local context. It also enables archiving of exported ACBs for analysis, and informing future advisories.

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For more information, please contact:

Tam Thi Le t.t.le@cgiar.org

Alliance of Bioversity International and CIAT

Cornelis Swaans c.swaans@cgiar.org

Alliance of Bioversity International and CIAT

Conclusion

The ACB approach is based on the LTAC framework (CIAT, et al., 2022), which positions feedback as a critical component of iterative learning and improvement. Human-Centered Design (HCD) provides a structured methodology and tools to systematically incorporate users' feedback on their needs, behaviors, and preferences into the design of climate services.

The experience of applying HCD to the ACB in Vietnam demonstrates the value of designing services with farmers rather than for them. Iterative prototyping and testing not only improved the bulletin's development process, content and format, and but also provided further insights for incorporating user feedback. The findings revealed clear gender-based differences in how farmers perceive and use the bulletin as well as differences among men and women. These highlight the importance of tailoring communication and advisory approaches to diverse user groups and considering individual goals, needs, and motivations.

While aligning WCS with institutional capacities and multi-level collaboration, sustained improvement depends on keeping users at the center of the design and decision-making processes, thereby ensuring their continued relevance, adoption, and impact.

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