



CASE STUDY



# Digitising Agriculture in Nepal

The GSMA Innovation Fund for Climate Resilience and Adaptation

## GeoKrishi

The GSMA Innovation Fund grant for GeoKrishi has assisted smallholder farmers in Nepal with climate adaptation and the adoption of climate-smart agricultural practices.

**Country:** Nepal

**Sector:** Agriculture

**Business model:** B2B, B2C

**Resilience capacity:** Climate adaptation

**Digital channels:** Mobile app, digital payments

**Problem addressed:** Enabling smallholder farmers in Nepal with access to hyperlocal weather data and expertise on agricultural practices for climate change adaptation.

**Stakeholders:** Individual smallholder farmers, government municipalities, cooperatives, agri businesses and extension service agents.

**Find out more:** [geokrishi.farm](http://geokrishi.farm)

### GEOKRISHI PROJECT OUTCOMES NOVEMBER 2022 TO APRIL 2024



237,3k

people reached



51,5k

farmers supported to adapt to climate change



97%

gained better access to localised weather information

96%



say their knowledge has improved on topics like plant nutrition and pest control



have acted on climate-smart recommendations



During the GSMA grant period, GeoKrishi unlocked an additional USD 760,000 in investment from other sources



## About GeoKrishi

GeoKrishi is a start-up based in Nepal with a mission to foster sustainable agricultural development, create green jobs and nurture the next generation of local agricultural entrepreneurs. Their digital agricultural platform is tailored to Nepal's diverse farming landscape and supplemented by offline service offerings to ensure inclusive access. GeoKrishi addresses challenges facing both smallholder and semi-commercial farmers by providing data-driven, climate-smart agricultural advisory services throughout Nepal's agricultural value chain. Their solution empowers farmers and local service providers with actionable insights on weather and digital learning content on adaptive farming practices, eliminating barriers to agricultural information for smallholder farmers, municipalities, cooperatives, agribusinesses and agricultural extension agents.

# Introduction

## Impacts of climate change on farmers in Nepal

In Nepal, climate change is contributing to more frequent, unpredictable and extreme rainfall events, the melting of higher altitude glaciers, flooding, heatwaves and droughts across the country. These changes are exacerbating the vulnerability of poor and remote communities that depend on subsistence agriculture. Agriculture is a key contributor to Nepal's economy, with 50% of the country's workforce employed in the sector.<sup>1</sup> In rural areas, agriculture accounts for 24% of gross domestic product (GDP).<sup>2</sup> In Nepal's first National Adaptation Plan, agriculture and food security are sectors flagged for urgent action.<sup>3</sup> However, without technical knowledge or data-driven advice, smallholder farmers in Nepal struggle to respond to the ever-changing risks of climate change, which prevents many from rising above the poverty line.

## About the GSMA Innovation Fund project

GeoKrishi is one of the start-ups supported by the GSMA Innovation Fund for Climate Resilience and Adaptation, which was launched in 2022. This initiative is funded by the UK Foreign, Commonwealth & Development Office (FCDO), the Swedish International Development Cooperation Agency (Sida) and is supported by the GSMA and its members.

The project spanned 18 months from November 2022 to April 2024. With the support of the GSMA Innovation Fund, GeoKrishi upgraded their existing service with digital learning content on climate-smart agricultural practices and expanded the reach of their bundled smart agriculture solutions. The Innovation Fund grant was also used to build a sustainable public-private-community business model by engaging closely with local government, local service providers and farmer cooperatives.



*Agriculture is no longer just farming; it is a business. It is important to attract our youth and farming communities for catalysing agricultural transformation through data, analytics and digital technological innovation that bridges the gap between science and practices.*

Rajan Bajracharya, Founder of GeoKrishi



1. Government of Nepal. (2021). *National Report: National Population and and Housing Census 2021 Results*.  
 2. Nepal Rastra Bank. (2023). *Current Macroeconomic and Financial Situation of Nepal*.  
 3. Government of Nepal. (2023). *Nepal National Adaptation Plan: 2021-2050*.

# How does the solution work?

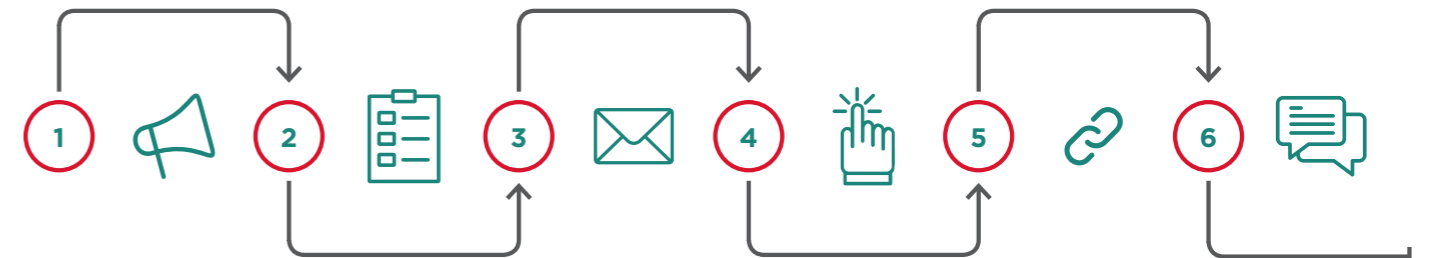
The GeoKrishi solution has the following features:

- 1 GeoKrishi app for farmers** – a farmer can use the app to access hyperlocal weather forecasts, a marketplace of agricultural input services and agricultural advisory and digital learning content.

Figure 1  
User interface of GeoKrishi mobile app for farmers



Figure 2  
Using the GeoKrishi app for farmers



### Marketing

Downstream partners such as farming cooperatives and individual farmer 'champions' promote the use of GeoKrishi through word of mouth.

### Registration

A farmer registers on the mobile app (via Android) providing details such as name, mobile number and geotagging their farm location.

### Subscription

Farmers can access all of GeoKrishi's services for free.

### Online features

The app provides access to live crop market prices, hyperlocal weather forecasts, digital learning, content on climate-smart farming approaches and an 'ask the expert' feature.

### Web app link

The web app version has features of aggregating outputs for collective marketing to buyers.

### Offline service

Farmers can use a SMS enquiry service for agro-advisory. Local co-ops act as agents between farmers and GeoKrishi to relay information. GeoKrishi also runs offline community clinics known as 'e-Chautari'.

**2 GeoKrishi enterprise app** – farming cooperatives and municipalities can use the app to engage with and track local farming practices, with tools such as a monitoring dashboard.

Figure 3  
User interface of GeoKrishi enterprise app

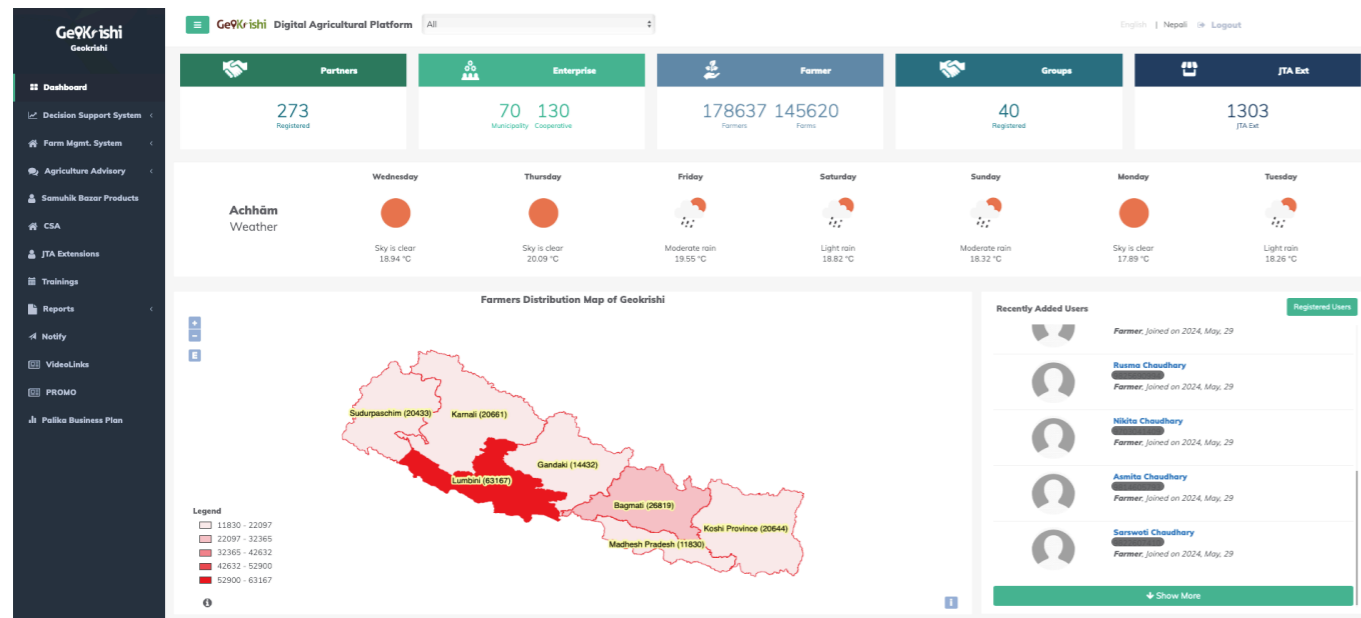
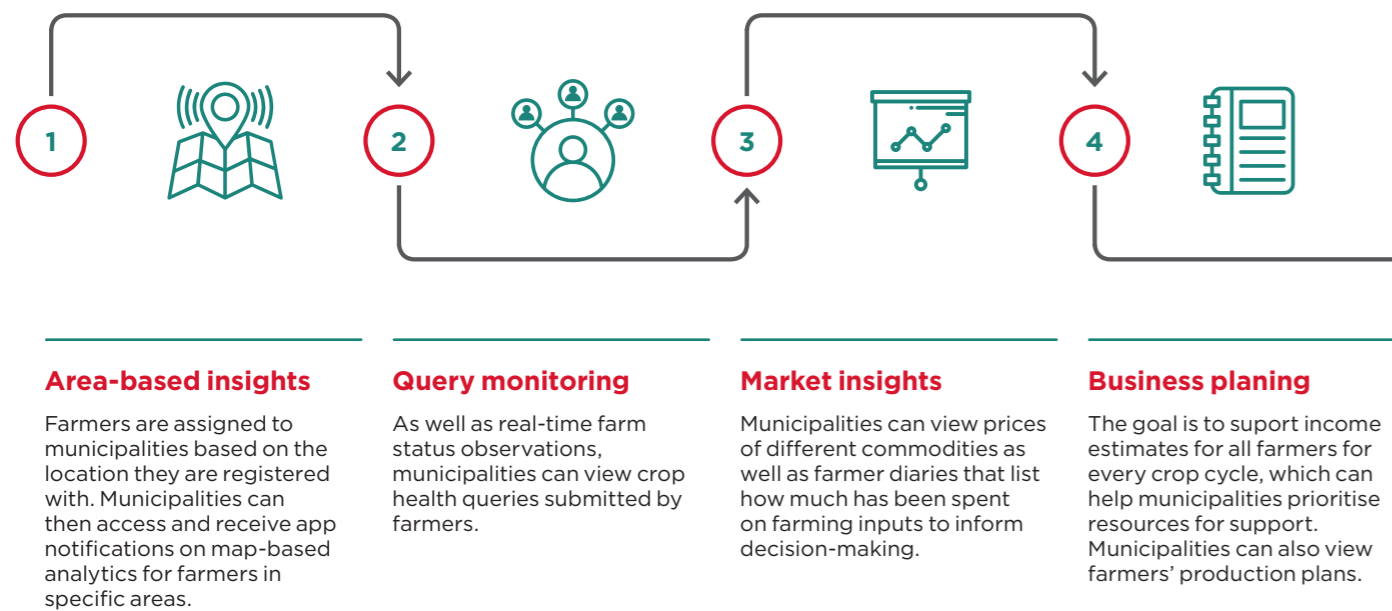
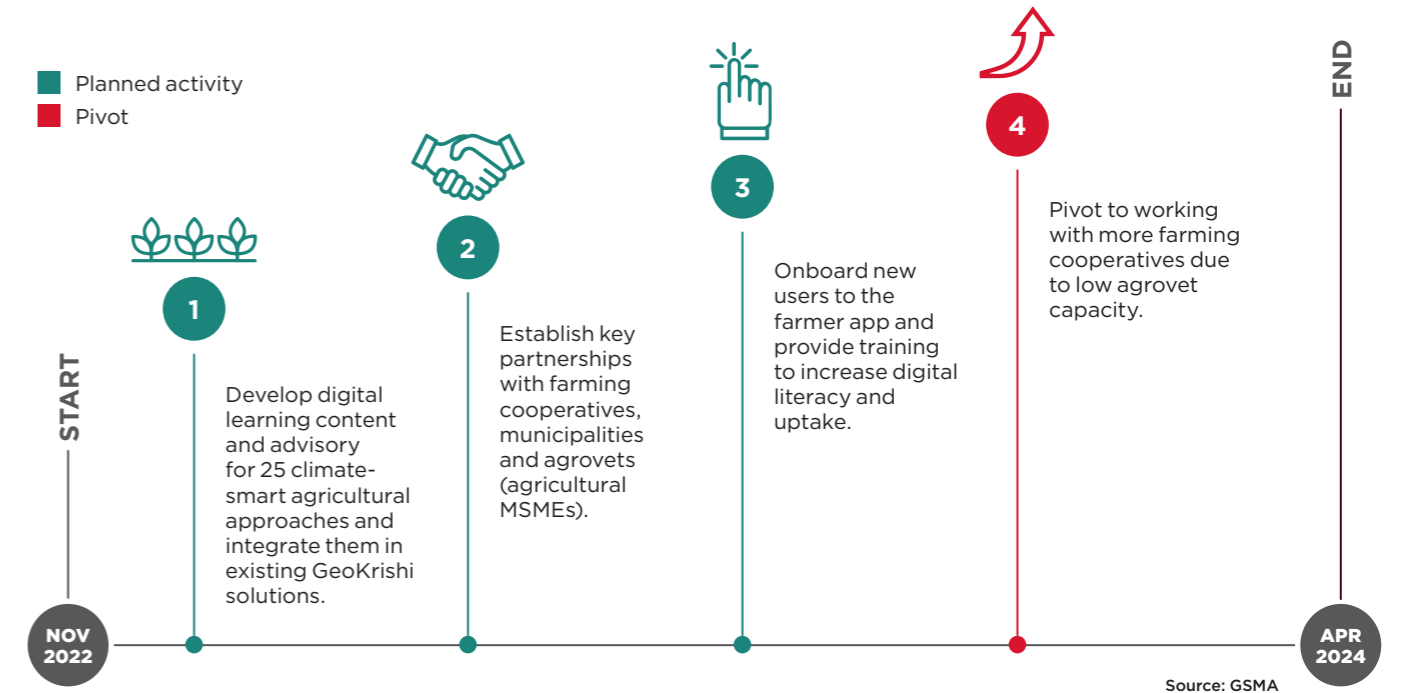


Figure 4  
Using the GeoKrishi enterprise app



## Key project activities

Figure 5  
Key milestones of the GeoKrishi project



### Implementation strategy

Before they applied for the GSMA Innovation Fund grant, GeoKrishi was already an established solution with distinct services for farmers, cooperatives and municipalities. With the grant, GeoKrishi sought to develop a climate-smart agriculture feature and integrate it with their existing solution. Their strategy to drive user registration and number of active users was to work with farming cooperatives, agrovets and municipalities, as well as individual farmers who would champion GeoKrishi's service and new features through word of mouth. Therefore, a large share of the project budget was allocated to marketing, customer engagement and workshops.

### Developing climate-smart advisory

Working with climate agri specialists and agronomists, GeoKrishi developed advisory content for climate-smart agricultural practices in five categories:

- **Water:** promoting tools like drip irrigation, mulching practices and soil cement tanks for rainwater storage
- **Energy:** expanding solar dryers, cool chambers, solar irrigation systems and minimum tillage practices
- **Knowledge:** encouraging good farming practices and integrated pest management (IPM)

- **Nutrients:** applying improved manures and biofertilisers to retain soil moisture, nutrients and carbon, and encouraging community-based bioinput production, such as vermicompost and biochar
- **Weather:** promoting high-yield, climate-resilient seeds and crop varieties, and the use of Internet of Things (IoT)-enabled devices, aligned with agribusiness plans.

This digital learning content featured toolkits and advice that were available on the GeoKrishi app. Training was delivered through free webinars for registered app users on topics such as biochar, or through the in-person “e-Chautari” workshops. Advisory was provided to farmers in their local language with supporting illustrations.

### Lesson 1 Working with agrovets proved to be challenging

Agrovets are small, family-run agribusinesses and were an initial target partner for GeoKrishi. Unfortunately, many agrovets were **unable to commit the time required to promote the benefits of using the GeoKrishi service** within their farmer networks. A dedicated digital platform was designed for them to manage their inventories and better liaise with farmers, but many expressed that they found it challenging to navigate the inventory management systems and new technology. In some instances, agrovets were also reluctant to share the details of their customer base with GeoKrishi, which was presumed to be due to a misunderstanding that GeoKrishi was a competitor.

Understanding the needs and constraints of agrovets, as well as building trust to overcome perceived competition, became necessary. Adjusting the partnership strategy based on these insights allowed GeoKrishi to pivot effectively to more receptive farming networks, namely farming cooperatives. Initially, GeoKrishi had planned to work with 60 agrovets and 20 cooperatives, but switched this to 60 farming cooperatives and 20 agrovets during the course of the project.

## Leveraging partnerships for customer acquisition and engagement

GeoKrishi’s marketing strategy was underpinned by a community driven, face-to-face campaign led by local community partners. To acquire new customers and engage farmers in using their services, GeoKrishi worked with individual farmers from across Nepal, as well as more than 60 farming cooperatives, several agrovets and municipalities with a strong local network. These partners provided a communication link to those who did not have access to a smartphone or the internet.

### Lesson 2 Working with a large network of partners incurred unforeseen costs

**GeoKrishi learned that reliance on a variety of downstream partners as part of their business model forced them to constantly adapt** to changes in partner staff, which led to additional expenses for refresher training on their online and offline services. This highlighted the importance of developing robust training programmes and fostering strong relationships with partners to mitigate disruptions. Ultimately, it underscored the need for flexibility in navigating the challenges of working with a wide network of local partners.

## Partnership with a mobile network operator

**During the grant period, GeoKrishi developed a partnership with a mobile network operator (MNO) to send subsidised SMS weather and advisory alerts to farmers, and provide subsidised internet data packages for farmers to access the GeoKrishi app.** Although the terms of this partnership are still being negotiated, it appears to be a promising endeavour with both GeoKrishi and the MNO keen to work together. As part of a broader community engagement effort, GeoKrishi plans to also partner with telecoms operators to offer tailored packages for marginalised communities.

# Building climate resilience

## Overall impact

GeoKrishi helped to build resilience to climate change in smallholder farmer communities. Their climate-smart agricultural advisory improved the capacity of farmers to adapt to climate change and access to hyperlocal weather information improved their capacity to anticipate climate shocks and stressors.

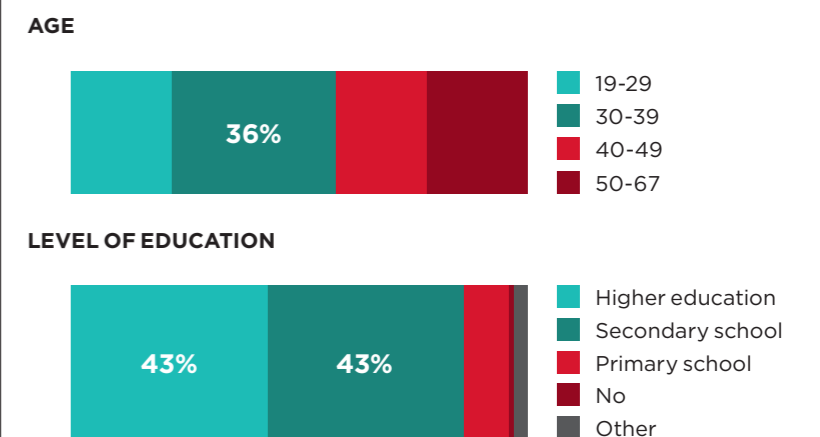
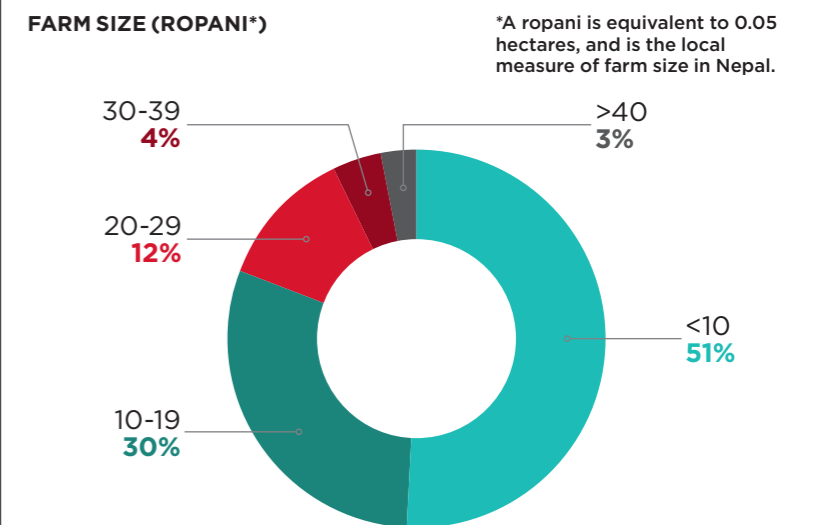
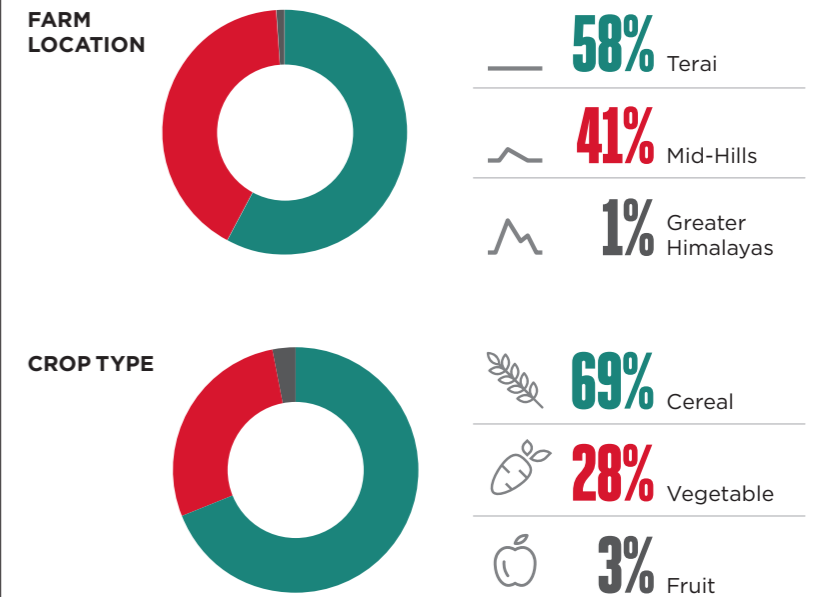
Based on interviews with GeoKrishi’s operations team and a sample of GeoKrishi users, the GSMA found that during the grant period GeoKrishi achieved the following:

- Provided approximately 51,594 farmers with support to adapt to climate change through the GeoKrishi mobile app, 57% of whom were women
- Created digital learning content and advisory for 30 climate-smart agricultural practices in five categories
- Engaged 2,113 farmers on climate-smart agricultural practices through training webinars
- Partnered with 61 cooperatives, 15 municipalities and 20 agrovets to share data-driven actionable insights with farming communities across Nepal

## GeoKrishi user profile

A typical user of GeoKrishi services is a smallholder farmer who is approximately 39 years old and has completed at least secondary or higher education. They are most likely to cultivate cereal crops, head up a family of five and have a personal monthly income of less than NPR 35,000 (\$262).

Figure 6  
GeoKrishi user statistics



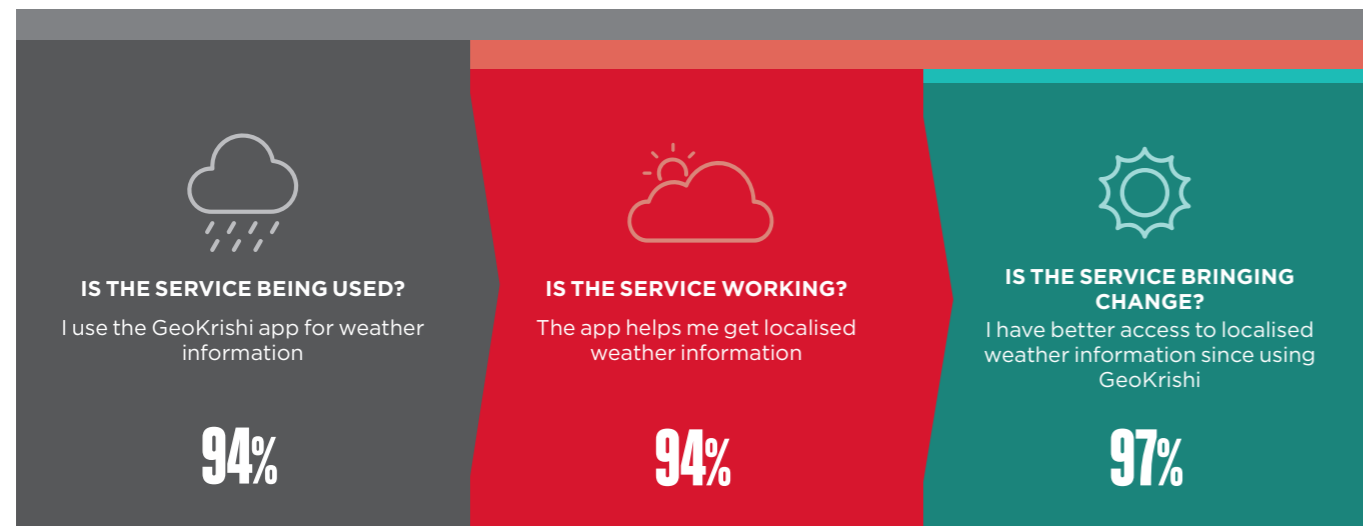
## Farmers report changing weather patterns, but only a minority are taking steps to adapt


GSMA research found that although **88%** of farmers said they had noticed changes in weather patterns and extreme weather events over the past five years, **70%** had not made any specific changes to adapt to the impacts of climate change. Just **18%** stated they had changed the crops they farmed to adapt to new weather patterns. However, we noted that due to the gradual onset of climate change, farmers may not have perceived their farming practices as an adaptation mechanism. Many of those interviewed referenced making climate-smart adaptations to their farming, despite not immediately recalling these changes.

Some of the farmers surveyed during the final assessment reported they had not received any support from institutional bodies to cope with the impacts of climate change. A gender disparity also emerged, with **88%** of female farmers reporting they had not received support to adapt to climate change, compared to **50%** of male farmers.

Figure 7

### Change in capacity to anticipate to climate shocks



 **“** The GeoKrishi weather app is a standout feature, I rate it 5 out of 5. **”**  
Female farmer

## Outcome 1: GeoKrishi helps farmers anticipate climate shocks and stressors

Hyperlocal weather information can improve farmers' resilience to climate change by enabling them to anticipate and prepare for extreme weather events, such as droughts, floods or storms. With timely access to accurate weather forecasts, farmers can adjust their planting schedules, irrigation practices and crop management techniques to mitigate potential damages and losses caused by adverse weather conditions. Weather information can also help with decision-making about appropriate crop varieties to grow and the implementation of climate-smart agricultural practices.<sup>4</sup>

We surveyed some of GeoKrishi's users to explore if the weather information service was helping them anticipate climate shocks and stressors and found the following, shown in Figure 7:

## Lesson 3

### Hyperlocal weather information proved to be effective in helping farmers plan and prepare

The GeoKrishi weather app significantly improves the ability of farmers to anticipate climate shocks, as evidenced by 97% of users who reported better anticipation of major weather events and 94% who found the app valuable for accessing localised weather information. These findings indicate the effectiveness of the app in providing relevant data for farmers to prepare and plan. Despite this exceptional feedback, GeoKrishi reflected on the challenges they faced in maintaining a forecast model. A key challenge was the source of their weather data not being updated, which meant that forecasts were not always current.

It was also noted that 6% of registered app users do not use the weather service, highlighting the importance of raising awareness and improving the accessibility of the GeoKrishi service.



**“** Now equipped with forecasted weather information in advance, we can take precautionary and proactive measures to safeguard our property and crops. **”**

Female farmer, 35 years

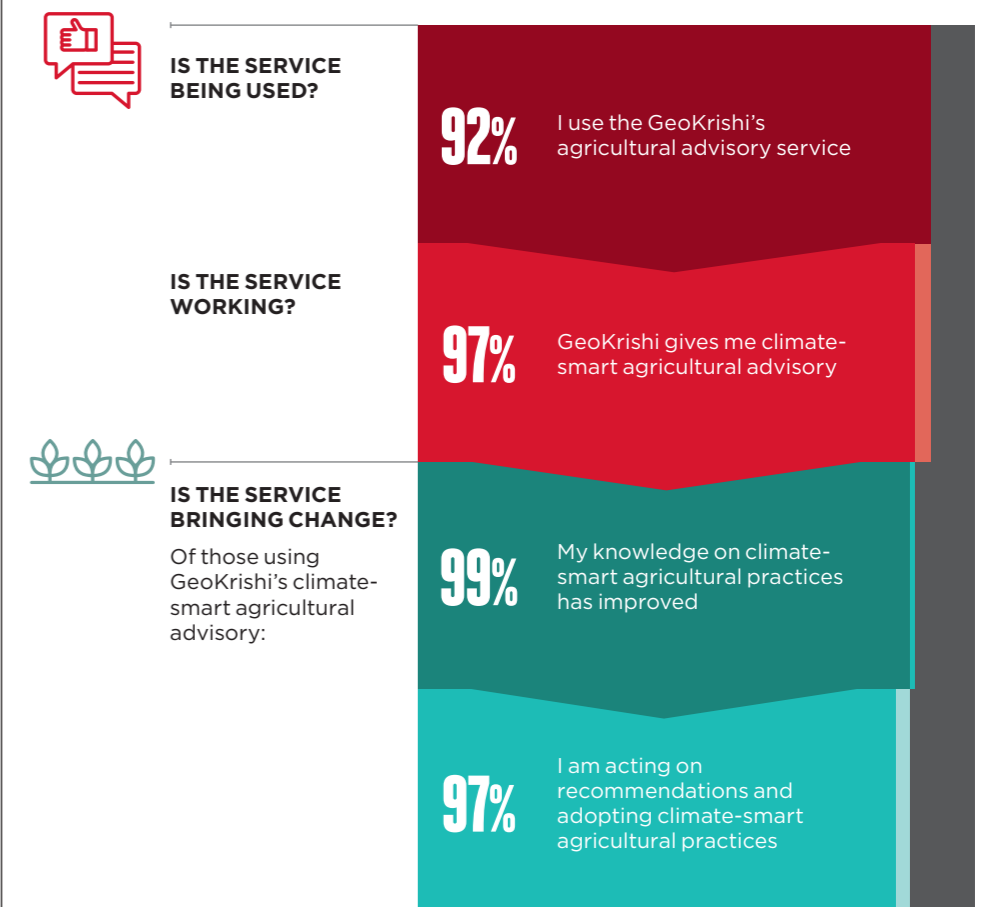
## Outcome 2: GeoKrishi helps farmers adapt their farming practices to a changing climate

Climate-smart agricultural advisory services can benefit farmers in Nepal by providing them with guidance on sustainable farming practices tailored to local climate conditions and challenges. This includes advice on efficient water use, crop selection, pest and disease management, soil conservation techniques and strategies for mitigating the impacts of climate change.

We surveyed some of GeoKrishi's users to explore whether the climate-smart agricultural advisory service was helping them adapt to climate change, and found the following, shown in Figure 8:

Figure 8

### Change in capacity to adapt to climate change



4. Food and Agriculture Organisation of the United Nations (FAO). (2017). *Climate-Smart Agriculture Sourcebook*, Second Edition.

## Lesson 4

### A blend of platforms, training styles and delivery channels were needed to deliver climate-smart advisory to farmers

The success of GeoKrishi's agricultural advisory services demonstrates that accessible, climate-smart advice can be effective in promoting widespread adoption of recommended farming practices. It was also noted in the research that many farmers were already aware of the concept of climate-smart farming practices, which highlights the importance of repeat messaging for behaviour change.

However, while webinars are valuable for introducing new concepts like biochar, their lengthy format posed a barrier to engagement for some farmers, suggesting the need for more flexible and easily accessible learning resources. The main lesson is **the importance of tailoring educational formats to accommodate diverse learning preferences and lifestyles in farming communities**. This could mean providing information digitally for those with a smartphone or through community workshops for those with a feature phone or no mobile phone.

## Lesson 5

### GeoKrishi's plant disease detection and advisory service was a popular feature among farmers

In-depth interviews revealed that **farmers found the plant disease detection and advisory service to be one of the most useful features of the GeoKrishi app**. Farmers can send photos of ailing plants to GeoKrishi via the app and SMS to receive expert advice on the disease affecting their plants and how to remedy it. Farmer feedback suggested that not only was this useful in treating plants quickly, but also helped them avoid the unnecessary purchase of agricultural inputs that could result if they tried to diagnose and remedy the problem themselves.

“



*We now have the convenience of seeking remedies by forwarding photographs through SMS, enabling a swift and efficient resolution of problems.*

Male farmer, 47 years

”

# What's next for GeoKrishi?

## Strengthening commercial viability

GeoKrishi has signed Memoranda of Understanding (MoUs) with 35 municipalities, five of which are paying for the use of the GeoKrishi enterprise app. Another eight municipalities have signalled a commitment to budget for GeoKrishi services in the coming year and are pursuing a contractual partnership.

The endline assessment revealed that **99%** of farmers plan to continue using GeoKrishi's services in the next six months. However, there is still room for improvement, as **19%** of users experienced some challenges navigating the GeoKrishi service. Much of this can be attributed to the user design and interface, with GeoKrishi receiving feedback that the climate-smart advisory content was challenging to navigate. The GSMA provided technical assistance to GeoKrishi on user experience (UX) and user interface (UI) design for the farmer app, and GeoKrishi is continuously seeking to improve the curation and accessibility of its digital learning content.

## Scaling up

GeoKrishi's success in addressing the climate-related challenges facing Nepalese farmers presents an opportunity to scale its model across Nepal.

**GeoKrishi is more commercially sustainable than they were at the beginning of the project, due to the refinement of their business model,**

**technical assistance from the GSMA on business development and investor readiness and lessons from the grant itself on user acquisition and engagement.** At the beginning of the grant period, GeoKrishi had 35 staff and a handful of digital champions. As of April 2024, they have 53 full-time staff, several part-time subject matter experts and facilitators from 50 farming cooperatives. GeoKrishi plans to continue building its farmer user base and developing new multi-stakeholder partnerships, including with local and national government, commercial banks and other financial institutions.

GeoKrishi is integrating their advisory services with a climate-smart input supply system that includes, for example, drip irrigation with moisture sensors, low-cost greenhouse tunnels, biofertilisers and IPM. This approach not only makes climate-smart tools more available to farmers, but also enriches their service portfolio through partnerships with community-based organisations and introduces an incentive mechanism and revenue-sharing model for cooperatives.

GeoKrishi has recently partnered with banks and financial institutions (BFIs) and microfinance institutions (MFIs) to integrate agri-wallet solutions on the GeoKrishi platform. This will lower banks' operational costs and enable phased loan disbursements based on business plan milestones. This approach expands access to financial services for farmers and promotes transparency, prevents misallocation of funds and improves the value of value of agricultural financial support. It can also support the development of a new revenue stream that will help GeoKrishi sustain their services for smallholder farmer communities.

## Lesson 6

### Resources and capacity are barriers to scale

The GeoKrishi team reflected on the pace of demand for new features and services overtaking their resources and capacity to deliver. Some farmers have expressed interest in IoT-enabled devices for agricultural support, but GeoKrishi has not yet been able to invest the necessary resources. GeoKrishi has piloted the use of artificial intelligence technology, but were unable to integrate it in their service beyond the testing phase due to a lack of resources and a skills gap that was difficult to fill.

Another key barrier has been the lack of mobile and internet access for end users, especially in rural areas, due to the high cost. GeoKrishi is trying to mitigate this with offline services for users and is exploring solutions with an MNO.

## Looking ahead

In the next five years, GeoKrishi aims to reach 1 million farmers in Nepal through partnerships with agricultural cooperatives, small and medium enterprises (SMEs), processing industries and other stakeholders.

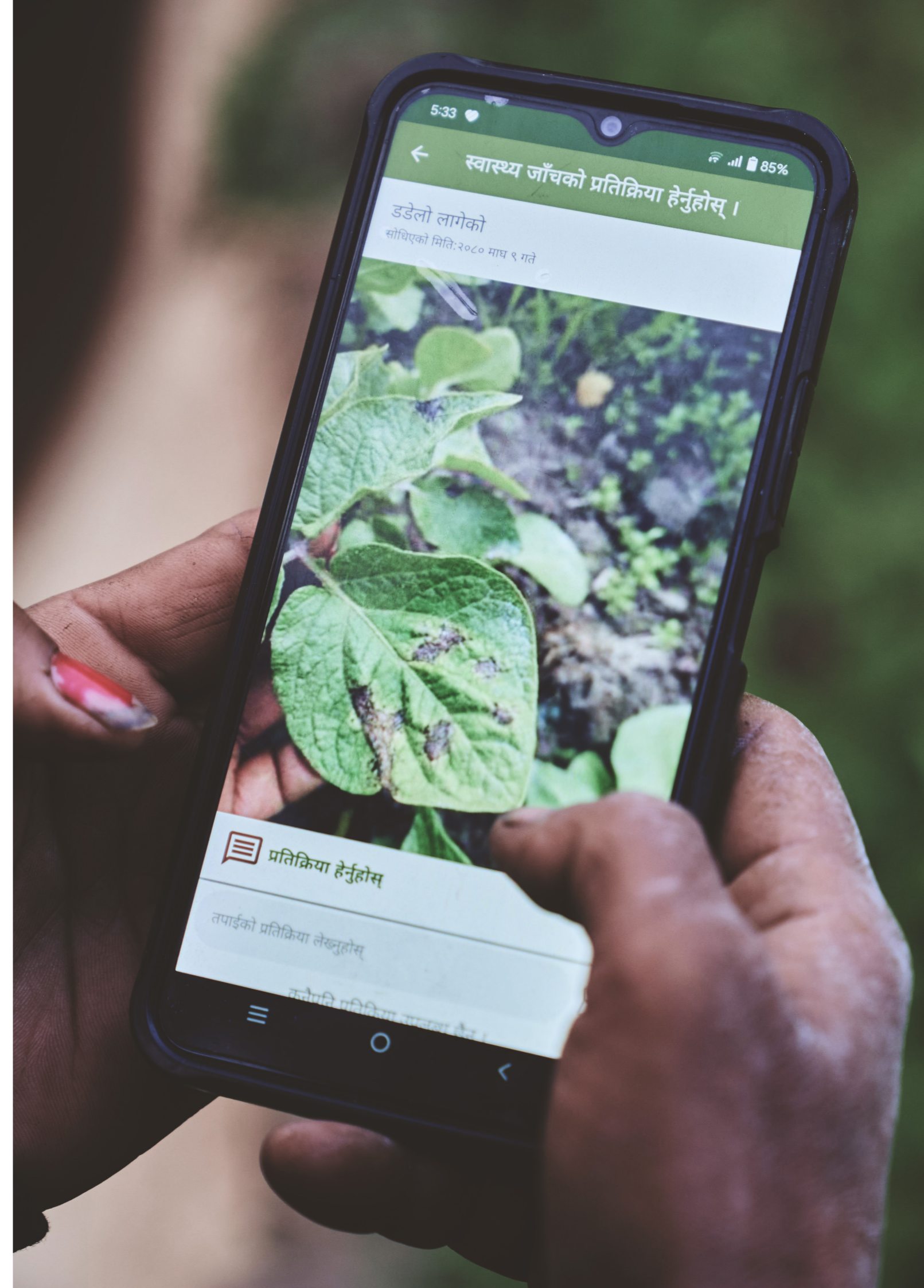
They plan to expand their services within the digital agricultural ecosystem by collaborating with market actors and financial institutions.

GeoKrishi will also strengthen government extension services and connect farmers with 200 local government agencies.

On the technology side, it will integrate AI for business automation, IoT for production efficiency and blockchain for traceability.

GeoKrishi will establish 250 brick-and-mortar e-Chautaris to provide in-person agricultural extension services, financial services and market access.

Finally, they are seeking new investment opportunities in agricultural inputs, processing products and the output market system, creating a holistic digital system to enhance the agricultural value chain and ensure sustainable revenue.







# Conclusion

With the support of the GSMA Innovation Fund for Climate Resilience and Adaptation, GeoKrishi has successfully addressed the pressing climate-related challenges faced by farmers in Nepal. Through their digital agriculture platform and partnerships with local communities, GeoKrishi has provided vital support to smallholder farmers, with a significant focus on empowering women. By offering tailored weather forecasts, climate-smart agricultural advisory services and digital learning content, GeoKrishi has enabled farmers to adapt to climate change and improve their agricultural practices. Despite challenges with partner engagement and user interface design, GeoKrishi demonstrated the strong potential of a sustainable and scalable digital solution to build climate resilience and have a positive long-term impact on Nepal's agriculture sector.

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