

PIP2001 Capstone Project
Review-1

KISAN BUDDY

Batch Number: CIT-G18

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Introduction

"Kisan Buddy" is an innovative solution aimed at empowering farmers with real-time information, personalized crop advisory, and market insights through mobile and digital platforms. The project seeks to leverage technology to improve agricultural efficiency, yield, and sustainability. By using Kisan Buddy, farmers can make data-driven decisions, optimize resources, and increase productivity. Agriculture remains the backbone of India's economy, with over 60% of the population relying on it for their livelihood. However, despite technological advancements, a significant portion of farmers continue to struggle with low yields, unpredictable weather patterns, and market fluctuations. "Kisan Buddy" seeks to address these challenges by offering farmers an easy-to-use mobile platform that provides personalized recommendations for crop management, real-time weather updates, and access to market rates for their produce. Additionally, the platform will integrate voice-assisted features to cater to farmers with varying literacy levels, making it inclusive and accessible. Kisan Buddy aims to modernize the agricultural sector and enable farmers to make informed, data-driven decisions to maximize their productivity and profits.

Literature Review

S.No	Author	Journal/Conference	Year	Proposed Algorithm	Technology Used	Drawback	Functionality	Results
1	Kumar, R. & Gupta, S.	International Conference on Emerging Technologies in Agriculture, 2023	2023	AI-based crop yield prediction	Machine learning, IoT sensors	High cost of implementation for small-scale farmers	The system predicts crop yields based on real-time data from IoT sensors in the field, which allows farmers to make data-driven decisions.	Yield accuracy improved by 30% compared to traditional methods, but adoption remains limited due to costs.
2	A. Gupta	Coupled life cycle assessment and business modelling to estimate the sustainability of using regenerated soils in urban forestry as nature-based solutions	2024	An IoT-based system was developed to continuously monitor crop health and environmental factors, such as soil moisture and temperature, and notify farmers when conditions require intervention.	The system uses IoT sensors, which feed real-time data into cloud computing systems for analysis and decision-making.	Connectivity issues in rural areas often result in delays in data processing and decision-making, impacting the effectiveness of the system.	The platform provides a comprehensive overview of crop health, allowing farmers to make informed decisions regarding irrigation, fertilization, and disease management.	While crop health improved and water usage reduced, rural infrastructure limitations, especially regarding internet connectivity, prevented consistent results across all regions.
3	Laisha Wadhwa, Garima Yadav	<i>Analytics India Magazine</i>	2024	AI & blockchain-based farm management	AI, Blockchain	Limited scalability among smaller farmers	Farmers are grouped based on crop and soil types to exchange information	Increased collaboration and yield but slow adoption.
4	T. Johnson	<i>Global Smart Agriculture Journal</i>	2024	Predictive algorithms for climate impact on agriculture	Big Data, Climate Models	Predictions can be inaccurate with incomplete data	Helps farmers adapt to changing climate conditions	Reduced risks from climate impacts but limited by data precision

S.No	Author	Journal/Conference	Year	Proposed Algorithm	Technology Used	Drawback	Functionality	Results
5	Sharma, Singh	IEEE Xplore - Digital Platforms for Farming	2023	Predictive analytics and decision support systems.	Big Data, AI	Complex technology requires high skill levels	Provides real-time data for pest management and fertilizer application	Better crop yields and resource management but low digital literacy limits access.
6	N. Gupta	Agricultural Informatics Journal	2022	Blockchain for farm product traceability	Blockchain, IOT	High cost of implementation	Ensures transparency in supply chains	Improved product authenticity but expensive to scale for small farms
7	R. Tiwari	<i>Agriculture Technology Symposium</i>	2023	AI-enabled decision-making platforms	AI, Cloud Computing	High bandwidth requirement	Helps farmers decide on planting and harvesting times	Improved decision-making but high operational costs
8	X. Zhang	<i>Journal of Smart Farming Technologies</i>	2021	AI-driven soil nutrient analysis	AI, Machine Learning	Requires constant data updates	Analyzes soil for nutrient deficiencies	Enhanced soil management but expensive for small-scale farmers

Existing method Drawback

- **Lack of Predictive Analysis:** Without the ability to predict weather patterns or pest outbreaks, farmers can only react to problems after they occur, often resulting in crop losses.
- **Connectivity Issues in Rural Areas:** Farmers in areas with poor internet connections often miss out on crucial updates when they need them most, such as weather alerts or pest outbreak warnings.
- **Language and Literacy Barriers:** Even when apps provide support for regional languages, the translations are often incomplete or not entirely accurate, reducing the effectiveness of the information.
- **Lack of Timely Information:** Delayed information, particularly about weather conditions or market fluctuations, can lead to poor planning and missed opportunities.
- **Reliance on Informal Loans:** Farmers often turn to local money lenders who charge exorbitant interest rates, leading to cycles of debt that can be difficult to escape.
- **High Dependency on Intermediaries:** Farmers often rely on middlemen or intermediaries for crucial information including market prices, buyers for their produce, and agricultural advisories. Middlemen can exploit farmers by providing inaccurate market price information or charging high commissions. Farmers might sell their produce at unfairly low prices, resulting in lower profits.

Proposed Method

1. Provides weather forecasts, crop advisories, and market prices in local languages.
2. IOT Integration for Precision Farming
3. Includes a voice-activated assistant for users with literacy challenges.
4. Integrates government schemes and financial services to support farmers.
5. Real-Time Localized Information and Weather Forecasts.
6. Crop Insurance Integration for Risk Mitigation.
7. Market Integration.
8. Knowledge Hub for Agricultural Best Practices.

Objectives

- **Accessibility for All:** To ensure that every farmer, regardless of their literacy or location, can access crucial agricultural information.
- **Real-Time Data:** To provide farmers with real-time weather forecasts, market prices, and farming tips that will help them make timely decisions to improve productivity.
- **Localized and Personalized Advice:** To use data-driven algorithms to offer crop-specific and region-specific advice that maximizes yield.
- **Promote Sustainable Farming Practices:** To encourage farmers to adopt sustainable farming practices that will benefit both the environment and their income over the long term.
- **Empowerment through Technology:** To bridge the gap between rural farmers and modern agricultural technology through an easy-to-use platform that can be accessed via basic smartphones.

Methodology

- Requirement Gathering and Analysis
- System Design
- Development
- Integration
- Testing
- Deployment
- Maintenance and Updates



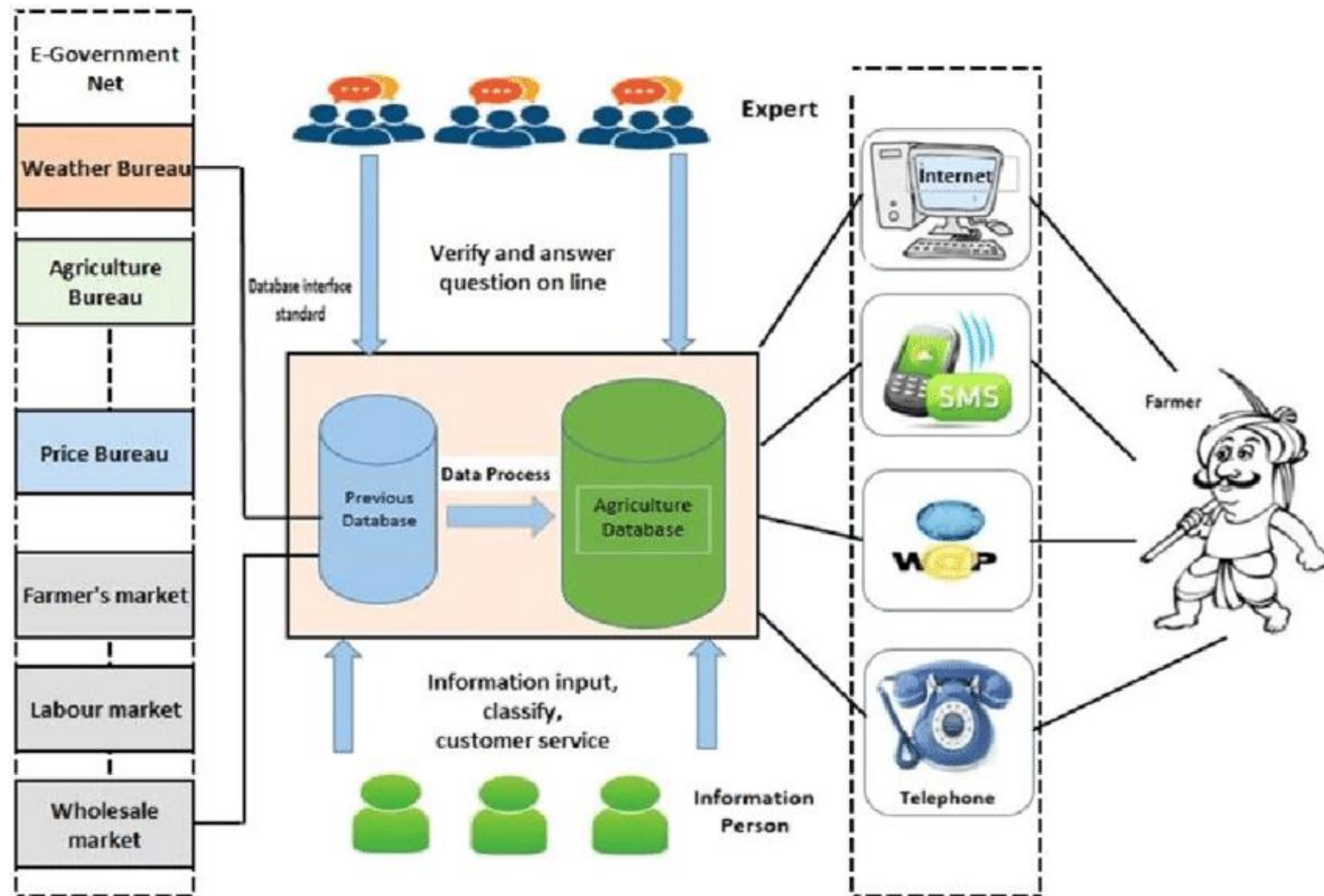
Modules

- **User Authentication and Profile Management:** This module handles user registration, login, and profile management. Farmers will register using their mobile number or a simple form, allowing the app to personalize services based on their location and crop choices.
- **Weather and Crop Advisory Module:** This module is responsible for providing real-time weather updates and crop-specific advisories. It integrates with external weather APIs and uses the farmer's GPS location to deliver localized forecasts.
- **Market Price Tracker:** This module will pull market data from local agricultural markets (mandis) and provide real-time price updates for different crops, helping farmers make informed decisions about when and where to sell.
- **IoT Integration Module:** This module integrates IoT devices, such as soil sensors and weather stations, to provide real-time data on soil moisture levels, temperature, and pest activity.
- **Data Analytics and Predictive Insights Module:** This module uses data analytics to generate predictive insights for farmers, such as expected crop yields, pest outbreaks, and optimal harvesting times based on historical and real-time data.

Modules

- **Crop Insurance and Risk Management Module:** This module integrates with crop insurance providers to offer risk management tools, helping farmers secure their crops from adverse conditions such as floods, droughts, and pest attacks.
- **Climate Change Adaptation Module:** This module helps farmers adapt to the challenges posed by climate change by offering climate-smart agricultural practices and long-term adaptation strategies.
- **Financial Literacy and Advisory Module:** This module provides farmers with financial literacy tools and expert advice on managing farm finances, securing loans, and increasing profitability.
- **Social Impact and Community Development Module:** This module connects farmers with community development initiatives, NGOs, and corporate social responsibility (CSR) programs to improve farm infrastructure, education, and social welfare.
- **Pest and Disease Diagnostic Module:** This module helps farmers identify crop pests and diseases using image recognition and real-time data, providing immediate solutions to protect crops.

Architecture



Hardware/software components

1. Frontend Technologies:

HTML/CSS: Standard web markup for structuring the app.

Tailwind CSS or Bootstrap (for responsive, mobile-first design).

2. Map API:

Google Maps API or Leaflet.js (for showing mandi locations and route maps).

3. Backend Components:

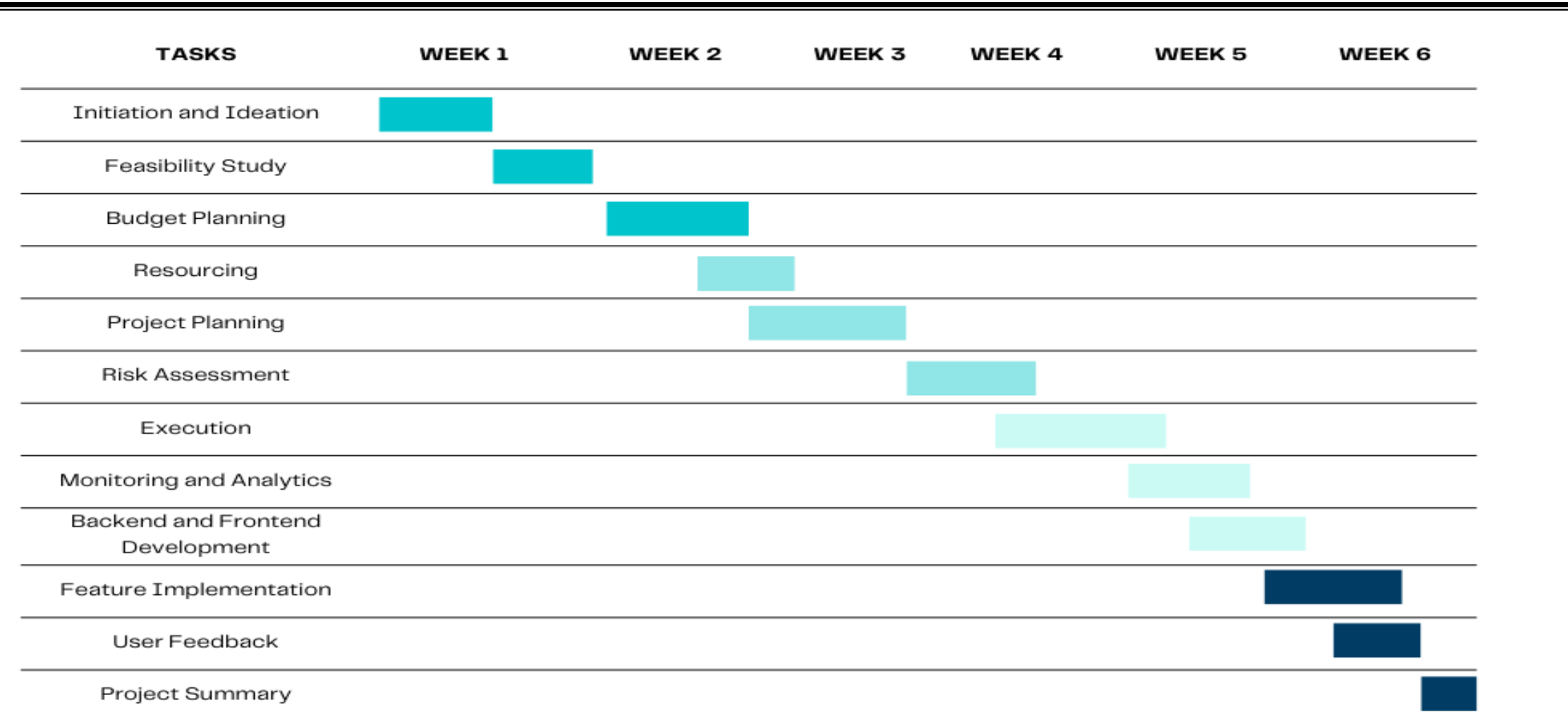
API Development: To expose data to the frontend (mandi locations, transactions).

Geolocation APIs: Google Maps API, OpenStreetMap API for calculating distances.

Cost Calculation Engine: Logic to handle the transportation and mandi transaction cost calculations.

Firebase Authentication: For an easy way to handle user authentication, especially in mobile apps.

Timeline of Project



Expected Outcomes

- A fully functional mobile application that provides Indian farmers with accurate, real-time information about weather, market prices, and farming techniques.
- Increased crop yields due to timely advice and better resource management.
- Empowerment of smallholder farmers by giving them access to technology, enabling them to compete in the larger agricultural market.
- Improved awareness and adoption of government schemes designed to benefit farmers.

Conclusion

The Kisan Buddy project is an innovative solution aimed at revolutionizing the agricultural landscape by empowering farmers with the tools and knowledge they need to make informed decisions. By integrating advanced technologies like real-time weather updates, market price tracking, IoT-based precision farming, and voice-activated assistance, Kisan Buddy addresses the core challenges faced by Indian farmers, such as limited access to information, financial resources, and market opportunities.

The platform promotes sustainable agriculture by offering personalized recommendations that optimize resource use and improve crop yields, while also ensuring financial inclusion through easy access to government schemes, loans, and insurance. Kisan Buddy's voice-activated interface and support for regional languages make it accessible even to farmers with literacy or technological barriers, making it a truly inclusive tool for all.

By aligning with global sustainability efforts, such as the United Nations Sustainable Development Goals (SDGs), Kisan Buddy contributes to reducing poverty, ensuring food security, and promoting sustainable farming practices. In conclusion, Kisan Buddy has the potential to transform the lives of smallholder farmers by enhancing their productivity, resilience, and profitability, ultimately driving rural economic growth and fostering a more sustainable agricultural sector.

Github Link

Github Link

https://github.com/Krt456/Kisan_buddy.git



References

- “Digital Platforms for Smallholder Farmers: Enhancing Agricultural Productivity and Market Access“
- “The Role of IoT and AI in Transforming Indian Agriculture: A Case Study of Kisan Buddy”
- Bridging the Digital Divide: Financial Inclusion and Government Schemes for Indian Farmers through Mobile Applications“
- “Empowering Rural Communities through Voice-Activated Agricultural Assistance: Overcoming Literacy Barriers in India”
- “Real-Time Data in Agriculture: The Impact of Weather and Market Price Updates on Indian Farmers“
- “Sustainable Farming Practices via Digital Platforms: A Case Study on the Implementation of Kisan Buddy“
- “Blockchain and Supply Chain Transparency in Agriculture: Opportunities for Indian Farmers”

Project work mapping with SDG

1. SDG 1: No Poverty:

Impact: The platform contributes to poverty reduction by improving farmers' livelihoods, promoting financial inclusion, and enabling sustainable income generation in the agricultural sector.

Contribution: By providing farmers with access to real-time market data, weather updates, and personalized crop advisory, Kisan Buddy helps increase agricultural productivity, leading to higher incomes.

2. SDG 2: Zero Hunger:

Impact: Kisan Buddy supports global efforts to achieve zero hunger by increasing agricultural productivity, improving food security, and promoting more sustainable and diversified farming practices.

Contribution: By improving the productivity of smallholder farmers, who produce a significant portion of the world's food supply, Kisan Buddy contributes to food security. The platform helps reduce post-harvest losses through better planning and access to market prices, ensuring that more food reaches consumers.

3. SDG 5: Gender Equality:

Impact: Kisan Buddy contributes to gender equality by empowering women in agriculture, providing them with equal access to information and financial resources, and supporting their participation in decision-making processes related to farming.

Contribution: The platform ensures that female farmers are equally informed about market trends, government schemes, and financial services, giving them the tools to improve their farming practices and increase their income.

Project work mapping with SDG

5. SDG 12: Responsible Consumption and Production:

Impact: Kisan Buddy supports sustainable agricultural practices and promotes efficient resource use, contributing to more responsible consumption and production patterns in the agricultural sector.

Contribution: The app helps farmers reduce food waste by providing timely information on market prices and connecting them to buyers, ensuring that produce reaches the market before it spoils.

6. SDG 13: Climate Action:

Impact: Kisan Buddy supports climate action by promoting sustainable farming practices that reduce greenhouse gas emissions, help farmers adapt to climate change, and protect agricultural productivity.

Contribution: The platform promotes climate-resilient farming techniques, helping farmers adapt to changing weather patterns and reduce the impact of climate change on their crops. By providing real-time weather data and predictive analytics, Kisan Buddy enables farmers to plan their activities more effectively, minimizing crop damage from extreme weather events.

Thank You !!!



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