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Contents

1	Introduction	1
1.1	Background	1
1.2	Problem Analysis	1
1.3	Our Work	1
2	Assumptions and Notations	1
2.1	Assumptions and Explanations	1
2.2	Notations	2
3	Models	3
4	Application of the Models	3
5	Sensitivity Analysis	3
6	Evaluation of the Model	3
6.1	Strengths	3
6.2	Weaknesses	3
7	Conclusion	3
	References	3

1 Introduction

1.1 Background



Figure 1: Deforestation for Farming



Figure 2: Deforested Forest

1.2 Problem Analysis

1.3 Our Work

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- 2
- 3

2 Assumptions and Notations

2.1 Assumptions and Explanations

- **Accurate Data Assumption:** The model assumes that the data used are accurate.
Explanation: The data used in the model are sourced from official databases, and we believe the data to be accurate and reliable.
- **Geographic Applicability Assumption:** The model assumes that the applicable region is Southeast Asia.
Explanation: The climate of Southeast Asia is simple, with only two seasons—rainy and dry. Additionally, the temperature variation within a year is minimal.
- **Planting Pattern Assumption:** The model assumes that two crops of rice are planted each year in the farmland.
Explanation: This aligns with the planting patterns commonly observed in South-east Asia, and the simplicity of crop types makes the model easier to establish.
- **Stable Lighting Conditions Assumption:** The model assumes that the region under study experiences stable lighting conditions throughout the four seasons.

Explanation: Since the model focuses on tropical regions, the variation in day-light duration across different months within a year is minimal, thus the lighting conditions are treated as constant in the model.

- **Stable Growth Environment Assumption:** The model assumes that no natural disasters, which could significantly impact the agricultural ecosystem, will occur during the time frame considered.

Explanation: Natural disasters are considered low-probability events in agricultural activities. To ensure the generalizability of the model, natural disasters should not be considered.

2.2 Notations

Symbols	Description
\mathbf{X}	Vector $[N_w, N_c, N_p, N_b, N_B, C_{hc}, C_{pc}]^T$, etc.
w	Subscription for weeds
c	Subscription for crops
p	Subscription for pest
bir	Subscription for birds
bat	Subscription for bats
hc	Subscription for herbicide
pc	Subscription for pesticide
C_i	Concentration of certain chemical
N_i	Numbers of certain species
α	abc

3 Models

4 Application of the Models

5 Sensitivity Analysis

6 Evaluation of the Model

6.1 Strengths

6.2 Weaknesses

7 Conclusion

References

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- [2] Rosenow D.T. et al. Drought tolerant sorghum and cotton germplasm. *Agricultural Water Management*, 7(1):207–222, 1983.