Ecosystem Collapse: Development Report of the Post-Apocalyptic Strategy Game "Mori Tokiwa"

——Technical Practice and Design Considerations with Unity Engine

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1. Overview of the work

Since the beginning of the 21st century, the entire world has faced unprecedented challenges. Rapid developments in science and technology and major social changes have led to more frequent and devastating natural disasters. As global climate change and ecological issues become increasingly severe, public awareness of environmental protection and sustainable development is gradually increasing.

However, traditional educational methods often fail to intuitively understand the complexity and fragility of ecosystems. As a human being, I am deeply moved by this and used it as inspiration to create "Forest Chronicle." I hope that through this game, players will be able to gain a bird's-eye view of the smallness and fragility of human society in the face of natural disasters. Through a gamified approach, the game aims to enable players to experience the importance of ecological balance, understand the impact of human activities on the natural environment, and learn to find a balance between nature and human development. This game is not just an entertainment product, but also an educational tool designed to inspire players to think about and act on environmental protection.

"Forest Chronicle" is a simulation game aimed at maintaining ecological balance. Players take on the role of "ecosystem managers" in a virtual forest area, managing resources, constructing facilities, and resisting human mutants (orcs) mutated by environmental pollution while responding to natural disasters and the needs of human development. The game employs an RTS-style resource management system, but the goal shifts from the traditional "conquest" to "coexistence."

The game is divided into three stages: "Basic Survival," "Ecological Crisis," and "Ultimate Disaster." The first stage is a relatively peaceful era with an excellent natural environment. Players can improve "ecological health" in preparation for the next stage by building houses and planting forests. The second stage is a period of survival skills and population growth, during which players build houses and strengthen defenses while dealing with mutants. During this stage, there are no hints about ecological health, and players must make their own decisions. The third stage is a period of catastrophe, during which players must protect core areas from disasters such as volcanic eruptions and floods and plan ahead using the wizard's prophecy.

In creating the game, we paid particular attention to the environmental feedback mechanism, taking into account real-world facts and gameplay experiences. Player actions (such as cutting trees or building) directly affect environmental indicators like soil quality and water pollution, impacting the survival of living organisms and the local ecosystem. At the same time, the game also offers strategic depth. Human understanding of disasters is not something that can be developed overnight. The ultimate goal of this game is to achieve an "ecological golden age"—a perfect balance between biodiversity, resource sustainability, and human well-being.

In terms of technology, we chose Unity because of its excellent and extensive plugin library (e.g., vegetation generation tools and weather system templates) that speeds up the development process, and its active community that provides technical support.

2. Production Procedure

Following the principle of "gameplay first, content second," we first identified the game's core elements and mechanics. The game revolves around the "butterfly effect under limited resources." Players must build the village's foundations (including houses and farmland), resist the first natural disasters (such as drought), and balance development through the "ecological health" indicator. The calculation formula is as follows:

This mechanic is designed to allow players to experience the delicate relationship between resource allocation and ecological feedback. For example, excessive deforestation leads to a decrease in forest area, which in turn reduces ecosystem health, affecting population growth and resource production.

Going forward, the development sequence will revolve around this core mechanism, gradually building the game's worldview, systems, and content in line with the "Basic Survival" era, the "Eco-Robot Club" era, and the "Ultimate Disaster" era.

Map and faction creation

First, create and customize a unique map and main color scheme for each era, as shown in Figure 1. Use the terrain tool to generate diverse terrain and divide resource distribution areas such as forests, plains, and mountains. Then, create factions and assign each faction unique buildings, units, missions, and restrictions. For NPC factions in particular, you can fully control their behavior through the Inspector and set different difficulty levels to provide a unique experience for each NPC battle.

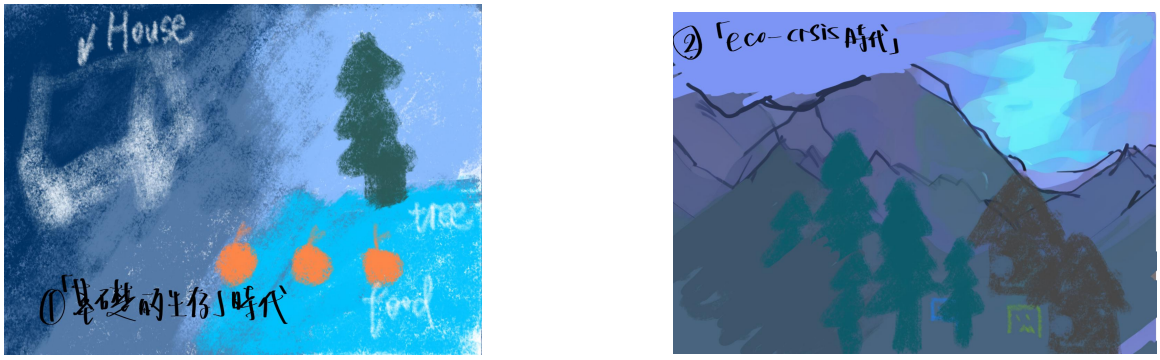

Figure 1 Main colors for each era

Resource System Development

Craft and customize different types of resources for each faction. These serve as the basis for building homes, launching missions, and creating units. Resource collectors can automatically collect resources or store them in buildings once a certain amount has been collected. Additionally, treasure objects are added to the map to reward factions that collect enough resources, increasing the game's exploration and strategic appeal.

Building and Unit Creation

Craft a variety of buildings, each performing different tasks for your faction. Buildings can be further customized by adding health and construction status, and their current health status can be displayed to enhance immersion. Each faction has its own border on the map. Within the area defined by the border, factions can develop resources and place buildings to form their own spheres of influence.

Unit Creation

When it comes to unit creation, you'll design multiple types of units to complete different tasks, such as building houses, collecting resources, generating resources, attacking other factions, healing other units, pitting enemy units against each other, and teleporting other units.

Figure 2 Unit sketch (part)

UI Design

The user interface (UI) is designed to provide clear information feedback and a convenient operation experience. It includes a task panel, resource panel, pause menu, tooltip menu, and a health bar that appears on hover, as shown in Figure 3. Gameplay tips for the current era are added to the bottom left corner of the screen, a map thumbnail is placed in the bottom right corner to help players navigate quickly, and various indicators of the current status, such as the amount of food, wood, and building materials, population size, and ecological health, are placed in the top left corner. This layout allows players to always stay informed of important game information and make wise decisions.

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3. Production introduction

The gameplay of the game can be understood through the resource management system and three rounds of gradual challenges.

Figure 4. Main menu with three eras

3 rounds of progressive challenges

Round	name	target	Unlock Abilities
Round 1	Basic survival	Learn how to play the game	Tree planting etc.
Round 2	Ecological Crisis	Construction of basic living facilities	Housing construction, population distribution, etc.
Round 3	The ultimate disaster	Protect yourself from the ultimate disaster	Ecological barriers

Figure 5. "Basic Survival" Era Screenshot

Resource Management System

Resource Type	How to get it	Core Objective
Tree	Planting	Pollution reduction
Commodity	Randomly generated in sunlight	Population maintenance
Houses	Press 2 to build	Relieve population pressure
Healthy life	Formula Calculation	Tips for players

Figure 6 Screenshot from the "Ecological Crisis" era

The three-round structure required us to detail each round's objectives, unlockables, and challenges, gradually increasing the difficulty while providing players with new tools and challenges.

4. Consideration

Throughout the development of this game, I deeply realized the importance of the "gameplay first, content later" principle in game development. In the early design stages, we focused on building core gameplay and mechanics, such as balancing ecosystem health and resource management and allocation, laying a solid foundation for subsequent content development. At the same time, I realized that game development is an iterative optimization process that requires continuous testing and adjustment to ensure the game's playability and balance. Furthermore, I learned how to effectively use tools and techniques to achieve design goals, such as controlling NPC behavior and adjusting AI difficulty through the Inspector. These technologies not only improve development efficiency, but also enhance the game's flexibility and scalability.

To realize the game's development intent, we needed to solve the following key issues:

Balancing game mechanics: Ensure that core mechanics, such as ecosystem health and resource management and allocation, are mutually coordinated to prevent certain mechanics from being too strong or too weak, thereby affecting the overall game balance. The solution is to continuously adjust and optimize mechanism parameters through extensive testing and data analysis to deliver the best possible game experience.

AI Behavior Diversity and Controllability: To make NPC faction behavior more diverse and controllable, AI-related components must be further developed and optimized to enable more intelligent and rational decisions based on different difficulty levels and game progression. The solution is to increase the AI's behavior tree and decision nodes, providing developers with more parameters and options to adjust.

Integrating and Testing Complex Systems: The game contains multiple complex systems, including a weather system and wizard prophecy mechanisms. Integrating and testing these systems poses significant challenges. The solution is to adopt a modular development approach, developing and testing each system individually, and then conducting integration testing to ensure system stability and compatibility.

Third-Era Problem Analysis and Improvement Methods
The construction of the Third Age was not completed as expected, primarily due to the complexity of the causes of events, the diversity of the weather system, and the deep integration of the wizard's prophecy mechanic. The interweaving of these elements presented many unforeseen challenges during the development process, such as the interaction between the wizard's prophecy mechanic and player decision-making.
If you think about it, there are a few ways to improve it that you can try.
Simplification and Modularization: First, we will simplify and modularize the complex systems of the Third Age, decomposing the event causes, weather system, and wizard prophecy mechanisms into independent modules that will be developed and tested separately. This will reduce development complexity and improve development efficiency.

Incremental Development: We will adopt a phased development approach, first completing the development of the core system, and then gradually adding and integrating other systems. For example, we will first complete

the basic framework of the event system, and then gradually add complex event logic. We will first implement the basic functionality of the weather system, and then gradually add weather types, effects, etc.

5. Thoughts

As the game gradually comes to life, we realize that the theme of environmental protection not only permeates every detail of the game design, but is also vividly reflected in the player experience. The core ecological health mechanism allows players to directly experience the delicate relationship between resource management and ecological balance with every decision. If players over-cut forests for short-term gain, resulting in a decline in ecosystem health and subsequently affecting population growth and resource production, this immediate feedback mechanism will undoubtedly raise players' awareness of ecological protection.

During the development process, we constantly considered how to combine complex ecosystems with game mechanics to allow players to think deeply about ecological protection while enjoying the game. By adjusting AI difficulty, controlling NPC faction behavior, and designing a diverse weather system, we simulated a realistic and varied ecological environment, allowing players to experience the urgency and importance of ecological protection within the game.

Looking back on the entire development process, we deeply realize the powerful potential of games as educational tools. They are not just for entertainment, but also an effective means of imparting knowledge and values. Through this game creation, I not only learned game design skills and techniques, but also deepened my understanding and knowledge of ecosystem conservation.

By understanding the course content and completing the game creation, I not only mastered the basic principles and techniques of game design, but also deepened my understanding of the importance of ecological conservation and its innovative applications in games. Every project in the course is full of challenges, but these challenges motivate me to continue learning and exploring.

In the future, I hope to continue exploring the intersection of games and environmental conservation, and incorporate more environmental knowledge and concepts into game design.