



## Review Paper

# Exploring the Role of Rewilding in Enhancing Ecosystem Services and Biodiversity Restoration in Degraded Ecosystems

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### Key Words

Rewilding,  
Ecosystem Services,  
Biodiversity Restoration,  
Conservation Strategy,  
Degraded Ecosystems,  
Species Reintroduction,  
Ecological Resilience.

### Abstract

Rewilding is becoming a vital conservation approach for restoring ecosystems and improving biodiversity, especially in eroded landscapes. The article examines rewilding as a means to preserve ecological services and restore biodiversity in ecosystems affected by human activities. The review examines literature and case studies of successful rewilding projects, including the reintroduction of apex predators and other key species, to explain the ecological payoffs of participating in such projects. It has been shown that rewilding can restore natural processes, enhance species diversity, and improve ecosystem functioning, such as water management, carbon capture, and soil fertility. Nevertheless, rewilding is not an easy task, as it has been hampered by environmental concerns, resistance, and a lack of funding. The paper presents the challenges and opportunities for formulating rewilding activities through targeted research, policy, and community involvement. Long-term monitoring, adaptation strategies, and overcoming socio-economic barriers to the expansion of rewilding projects should be the focus of future research. The results also support the approach of rewilding larger conservation landscapes to sustain sustainable, resilient ecologies amid shifting climatic conditions and declining biodiversity.

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## Introduction

Rewilding is a conservation methodology that involves reintroducing native species and the natural processes that once made up an ecosystem to restore it (Wang et al., 2025). Rewilding is a contrast to conventional conservation, which aims to leave the habitat unchanged; rewilding is a practice that actively intervenes in the landscape to re-establish ecological processes and biodiversity (Mutilod et al., 2024; Liu et al., 2023). Reintroducing apex predators and other large herbivores through ecosystem rewilding restores natural processes across trophic levels, which is crucial for maintaining ecological balance and health (Veerappan, 2024). This is a dynamic restoration that helps restore natural dynamics lost due to human interference. Rewilding may result in a more balanced system through strengthened predator-prey dynamics, regulated vegetation cover, and improved nutrient cycling (Hong et al., 2025). In the long term, recovered ecological functions can enhance the resilience of systems to external stressors that may complicate the structures, e.g., climate change and species invasions (Kalliiolevo et al., 2025; Hawkins et al., 2025). Ecosystem services are the benefits that ecosystems provide to the environment and human societies, which are key to their well-being. These services are climate control, water purification, food, and biodiversity (Bugalho et al., 2025). Biodiversity restoration is a significant element of ecosystem recovery, as species interactions provide these services. Rewilding is also seen as a way to improve these services in damaged ecosystems, with ecological and socio-

economic benefits (Ndubuisi & FNisafetyE, 2025; Demirtaş & Güneş, 2025). To illustrate this, healthier ecosystems can address the impacts of climate change through carbon sequestration and natural disaster mitigation, e.g., flood prevention through restored wetlands. Also, ecotourism and sustainable agriculture can be encouraged through rewilding to restore ecosystems, thereby stimulating local economies (Ahmed, 2024). The long-term positive impacts of rewilding on nature and human society include the restoration of biodiversity and ecosystem services (Athumani et al., 2023). Irrespective of rewilding potential, the world's ecosystems face a severe risk of degradation from human activities such as deforestation, urbanization, and industrial agriculture. Environmental degradation of the ecosystem diminishes the supply of ecosystem services, thereby adversely affecting biodiversity and human livelihoods (Ugah et al., 2025). To avoid these problems, new practices, including rewilding, are being developed to help restore ecosystem functions, improve biodiversity, and reduce the impact of climate change (Upadhyay & Singh, 2024). Species extinction and ecosystem destruction typically trigger a chain reaction that disrupts ecosystem processes and the services they provide. The process of rewilding offers a rare opportunity to undo some of this harm by restoring ecological processes critical to biodiversity (Rawski, 2023).

Rewilding can also improve ecosystems and make them more resilient to the effects of human activity by reintroducing populations of key species, fostering a more sustainable relationship

between nature and people (Bosco, 2025). This paper discusses how rewilding can improve ecosystem performance and help restore biodiversity in damaged ecosystems (Shekhar et al., 2024). It also covers the history of rewilding as a conservation strategy, provides examples of successful case studies, and discusses the challenges and opportunities of scaling up rewilding efforts (Stark et al., 2025). Other research and policy recommendations in the paper include the need for additional research and policies to facilitate adaptive management and realize the full potential of the rewilding initiative in conservation efforts globally. To be successful in rewilding, it is necessary to understand the ecological, social, and economic context in which it will be implemented (Smith, 2025). Also, the involvement of stakeholders and local communities, governments, and conservation agencies is critical to the effectiveness and viability of rewilding projects (Trouwborst, 2025). Flexibility and keen observation would also play a crucial role in adapting to changing situations and, in the long run, winning in rewilding initiatives.

### **Key Contribution**

- The article explores how rewilding can augment the provision of an ecosystem, such as carbon capture, water control, and biodiversity protection, through mechanisms such as species reintroductions and habitat restoration, in a degraded ecosystem.
- Drawing on global rewilding experience, the paper examines successful strategies,

outcomes, and lessons from rewilding in real ecological contexts.

- The paper identifies obstacles to scaling rewilding efforts, including social, political, and financial challenges, and provides recommendations to address them and achieve the long-term success of rewilding projects.

The researcher in this paper explains the way rewilding can enhance the provision of ecosystem services and catalyze the recovery of biodiversity in degraded ecosystems. The paper opens with a definition of rewilding and its importance in restoring ecological processes and biodiversity, then provides a historical account of rewilding as a conservation practice. This part of the article presents the methodology, the literature review, and an analysis of successful rewilding projects to determine their effects on the restoration of ecosystem services and biodiversity recovery. The results section presents the benefits of rewilding, including improvements to the ecosystem, carbon sequestration, water management, and comparisons of different rewilding options. The paper presents the limitations and difficulties of rewilding, including ecological uncertainty and social-political opposition, and future research and policy directions to increase rewilding efforts. The paper concludes with prominent findings and the significance of rewilding in establishing resilient ecosystems and minimizing biodiversity loss. The paper concludes with notable results and the importance of rewilding for developing resilient ecosystems and reducing biodiversity loss.

## Methodology

The present paper employs a case study and data analysis to discuss the role of rewilding in improving ecosystem services and facilitating the

restoration of biodiversity in degraded ecosystems. The strategy is to evaluate the effectiveness of rewilding across various ecological settings by comparing the project's real-world implementation and its outcomes.

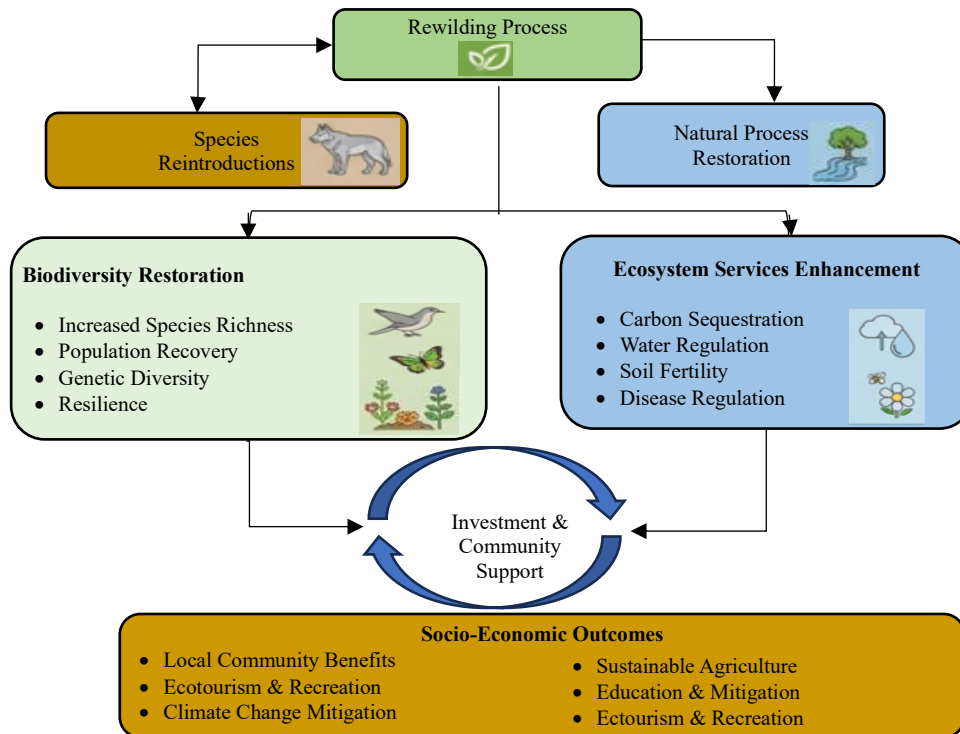


Figure 1: Rewilding Process and Its Impact on Biodiversity and Ecosystem Services

Figure 1 could be considered the overall rewilding procedure and the complex impacts on biodiversity healing and the expansion of ecosystem services. It will involve reintroducing species and restoring natural processes, thereby increasing species richness, population recovery, and ecosystem resilience. The diagram illustrates that these ecological benefits enhance the provision of essential ecosystem services, including carbon sequestration, water regulation, and disease control. In addition, it outlines the socio-economic benefits of rewilding, namely, benefits to local communities, ecotourism, and sustainable agriculture. The sketch also shows the interdependence between ecological

restoration and the need to facilitate and invest in rewilding initiatives to ensure their long-term success.

## Case Study Analysis

The major one will be through the selection and analysis of case studies of rewilding in various types of ecosystems, e.g., temperate forests, wetlands, and grasslands. The issues of interest in such case studies are the reintroduction of key species (e.g., apex predators and keystone species) and the restoration of essential ecological processes. Among them are the reintroduction of wolves to Yellowstone National Park and beavers in the UK, as well as the

extensive rewilding of the Scottish Highlands. It is done on a case-by-case basis, based on the objectives, procedures involved, species, and the ecological and social implications of studies. The changes in species population dynamics,

biodiversity levels, and ecosystem performance, such as the enhanced efficiency of ecosystem services, like carbon sequestration, water regulation, and soil fertility, will be evaluated with the help of the analysis.

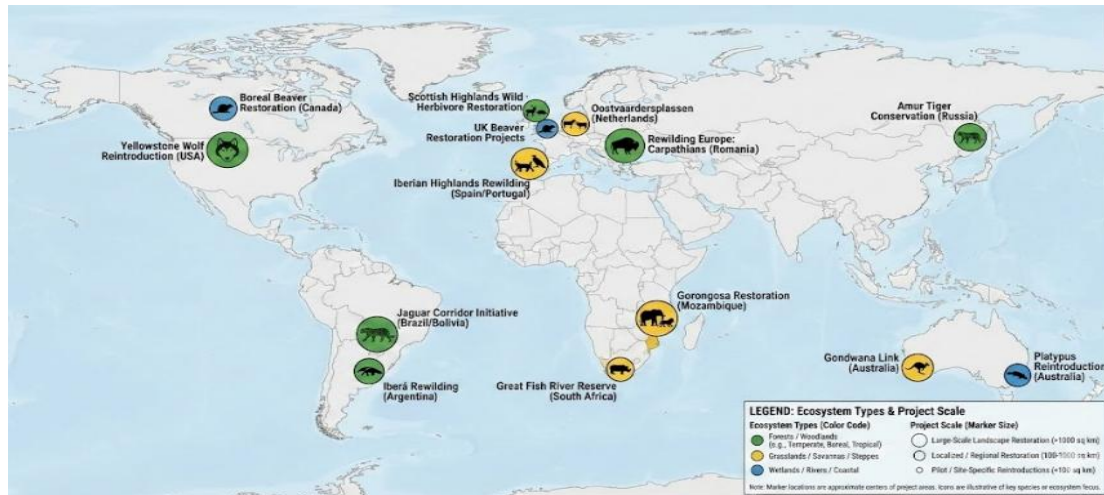


Figure 2: Global Map of Rewilding Projects Focused on Biodiversity Restoration

Figure 2 summarizes major global rewilding initiatives aimed at restoring lost biodiversity in damaged ecosystems. It also brings to light the places where major rewilding has occurred, such as the reintroduction of such species as wolves, beavers, and tigers, and large-scale habitat restoration projects. The map visualizes the various types of ecosystems and the magnitude of such projects, which provides an insight into the global magnitude of rewilding as a conservation mechanism. All sites will be indicated by appropriate symbols and color codes of the kind of ecosystem (forests, wetlands, grasslands, etc.) and project size (regional or large-scale restoration). It is through this drawing that we can illustrate the prevalence of rewilding activities the world over concerning the improvement of biodiversity and the operations of the ecosystems.

## Data Collection and Analysis

The project reports, monitoring systems, and other pertinent ecological measures would be used to collect the outcome of the rewilding activity. This entails information regarding the population of the species, biodiversity, and ecosystem services, which had been damaged as a result of the rewilding exercise. The statistical analysis will be conducted to compare the biodiversity and ecosystem service levels prior to the rewilding intervention and after the rewilding intervention. Further, qualitative data, including the views of stakeholders and social effects, would be taken into account to determine the impact of rewilding projects in general on local populations and the political processes.

## Impact Assessment Framework

In the overall assessment of the outcomes of the rewilding projects, the paper will use an

impact assessment framework that embraces ecological and socio-economic aspects. In environmental terms, the evaluation will draw attention to such indicators as the diversity of the species, the quality of habitat, as well as the recovery of the natural processes, including the predator-prey relationships and the growth of plants. On the socio-economic level, the framework will investigate the social involvement of the community, the local acceptance, and economic gains associated with rewilding. The holistic approach will provide a more comprehensive image of the success of the rewilding process and underline the trade-offs between ecological restoration and socio-economic factors.

## Results

The findings of the rewilding activities are presented in the results section, and the benefits of the activities are highlighted in enhancing the ecosystem services and biodiversity recovery. Here, the authors summarize the significant findings of the case study analysis and the gathered data, defining the positive environmental outcomes and effectiveness of different rewilding strategies.

### Rewilding Advantages in Improving Ecosystem Services

The rewilding efforts have demonstrated a significant enhancement in the ecosystem services in diverse ecological settings. One such example is that the reintroduction of wolves in Yellowstone National Park has caused a trophic

cascade, which has assisted in restoring vegetation, mainly willow and aspen trees, and better water regulation by regenerating riparian ecosystems. Similarly, the introduction of beavers again has been of untold impact on wetland ecosystems, and new habitats have been created, and many species are found in it, water is filtered, and floods are managed. These results show the possibility of rewilding to re-establish the necessary processes in the ecosystem, including nutrient cycling, water management, and soil fertility, which are not only crucial to the health of the ecology but also to the health of people.

### Rewilding Impact on the Repair of Biodiversity

Biodiversity is one of the most critical consequences of rewilding. The reintroduction of several key species, especially apex predators, has brought about higher species diversity and recovery of endangered species. As an example, the reintroduction of wolves within Yellowstone has allowed the regulation of herbivore populations (e.g., elk) and, subsequently, led to the resurgence of the understory vegetation and greater abundance of small species (e.g., birds and insects). On the same note, the reintroduction of wild boars in some areas of Europe has given rise to the re-emergence of some plant species and the enhancement of soil structure. All in all, rewilding has already proven to be able to reverse the loss of biodiversity through population recovery of species and enhancing the quality of the habitat.

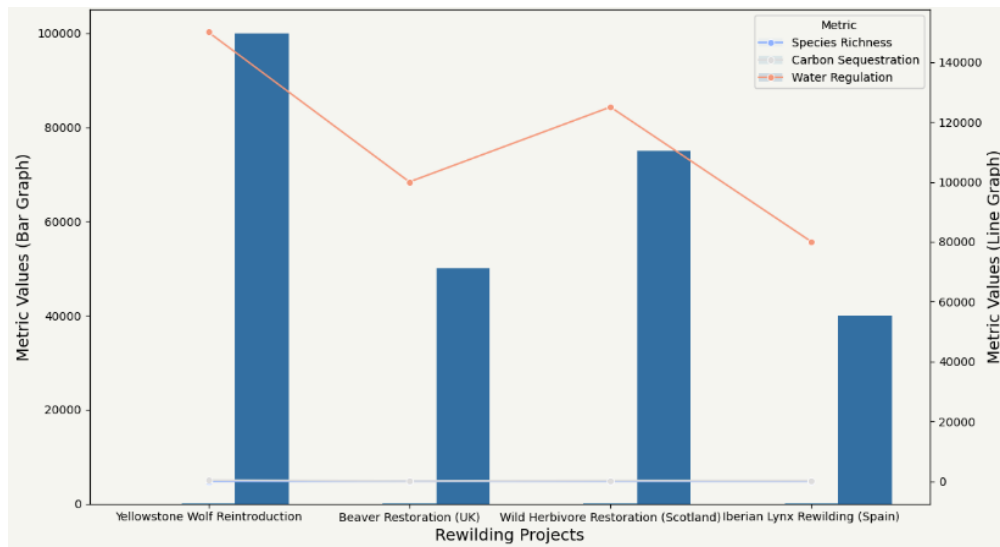


Figure 3: Impact of Rewilding Projects on Ecosystem Services and Biodiversity Metrics

Figure 3 compares the impact of the different popular rewilding projects on the various ecological metrics, including species richness, carbon sequestration, and water control. The bar graph shows the levels of species richness and carbon sequestration of each rewilding project, whereby the higher the bar, the greater the impact on the project. The line graph superimposes the water control scale, indicating its comparative variation among the projects. Its rewilding projects include the Yellowstone Wolf Reintroduction (amenities USA), Beaver Restoration in the UK, Wild Herbivore Restoration in Scotland, and Iberian Lynx Rewilding in Spain. The results confirm that different rewilding schemes produce an eclectic spectrum of favorable results in an assortment of ecosystem services, with Yellowstone having an impressive positive effect on species richness and carbon fixation, whereas water management is greatly enhanced in the Wild Herbivore Restoration undertaking in Scotland. The diagram cuts right to the point of rewilding being ecologically diverse.

### Comparison of the Effectiveness of Rewilding Strategies

Various rewilding approaches have been different in their effectiveness, based on the ecological context, species chosen, and intensity of the intervention. Top-down approaches, as in the process of reintroducing predators with high-energy consumption rates, like the wolves, have also been quite successful in ecosystem transformation through intervening with the trophic interactions. Conversely, bottom-up methods, including the reintroduction of herbivores or the regeneration of native vegetation, have worked successfully when it comes to habitat restoration and better species diversity. As an illustration, heathlands have been regenerated with the introduction of more plant diversity as wild herbivores like the Highland cattle have been reintroduced to the Scottish Highlands. Such a comparison of strategies gives an understanding of the relative benefits and limitations of them, and this allows future attempts at rewilding.

Table 1: Comparison of Rewilding Strategies and Ecosystem Outcomes

Rewilding Project	Species Reintroduced	Biodiversity Improvement	Ecosystem Service Enhancements	Other Key Outcomes
Yellowstone Wolf Reintroduction	Wolves	Increased elk population control, vegetation regeneration	Carbon sequestration, water regulation	Restoration of riparian areas
Beaver Restoration (UK)	Beavers	Wetland habitats regenerated, species diversity in wetlands	Water filtration, flood prevention	Increased biodiversity in wetlands
Scottish Highlands Wild Herbivores	Wild cattle, deer	Improved plant diversity, native species regeneration	Soil fertility, carbon sequestration	Regeneration of heathlands
Iberian Highlands Rewilding	Iberian lynx, wild boar	Improved predator-prey dynamics, species recovery	Habitat restoration, pollination	Increased ecotourism in the region
Gorongosa Restoration (Mozambique)	Elephants, buffalo	Increased species populations and plant regeneration	Soil fertility, water regulation	Enhanced tourism and local economy

Table 1 gives an overview of other world rewilding projects in comparison with each other and provides an overview of the primary outcomes in terms of species reintroduced, restoration of biodiversity, and enhancement of ecosystem services. It uses the outcomes of projects like the reintroduction of wolves in Yellowstone National Park, the reintroduction of beavers in the UK, and the reintroduction of wild herbivores in the Scottish Highlands as a comparison. The rows indicate different rewilding projects, including the name of the species, the outcome in terms of the biodiversity (e.g., the recovery of the species, the regeneration of the habitat, the soil fertility), and the respective ecosystem services (e.g., carbon sequestration, water regulation, soil fertility). Also, the table shows other significant effects of such projects, which may include more local biodiversity, restoration of habitats, and socio-economic values like ecotourism or agricultural development. The variety of the impact of rewilding tools, highlighting the numerous processes in different ecological environments, is

a result of this comparative analysis, as it demonstrates the broad level of benefits of the novel conservation army.

## Discussion

The results are critically discussed in the discussion section by identifying the challenges and limitations of rewilding, future research direction, policy implications, and expansion of rewilding. Although rewilding has an enormous ecological advantage, the effective execution and scaling of such initiatives entail dealing with a variety of factors that may influence the results of the projects.

Although the outcomes of rewilding are promising, various challenges and constraints should be resolved to make the initiatives more popular. The uncertainty of long-term results is one of the significant environmental problems. Reintroduced species are not always able to adjust to their new habitat as anticipated, or the introduction may have unknown ecological impacts on the existing species. In a case in point, when apex predators such as wolves are

reintroduced, they may meddle with the activities of human beings, especially in livestock rearing, resulting in clashes with the local communities. Furthermore, the effectiveness of rewilding projects can also be contingent on the scale and interconnection of the re-created habitat, and this can be effective only with a large-scale effort, which is hard to achieve in a fragmented landscape. There are also social and political barriers that are a challenge. The opposition of the local communities, policymakers, and stakeholders can slow down the process of adopting the rewilding initiatives. Moreover, the budgetary expenses involved in the rewilding exercises, such as the restoration, monitoring, and management of the habitats, are cost-prohibitive without proper funding and sponsorship.

In the future, the study can be continued by considering these issues and examining ways of adaptive management, long-term effects, and socio-economic consequences of rewilding. Studies are required to know the ecological limits beyond which reintroductions of species turn out to be futile or even harmful to the ecosystems. Rewilding proposals require assessment of long-term biodiversity changes and recovery of ecosystem services, making it comparatively simple to evaluate the sustainability of long-term rewilding initiatives. Also, it requires more studies of how rewilding programs relate to the local population, especially in terms of socio-economic consequences. The realization of how rewilding could fit into the larger conservation and land-use management strategies will be essential in terms of its ability to scale up the

activities and make them ecologically and socially acceptable.

This study has significant policy implications for conservation practitioners and policymakers. Rewilding is a component of a greater conservation policy, in addition to traditional conservation and restoration initiatives. The policymakers need to develop systems that will accommodate ecological restoration as well as socio-economic interests, such as agricultural, recreational, and tourism. Moreover, it is possible to incorporate rewilding into the national and regional plans concerning biodiversity conservation to obtain funding and political support. The governments can also encourage people-government collaboration and community engagement to deal with opposition and guarantee that rewilding efforts will be successful in the long term. Good governance, well-articulated objectives of management, and responsive management practices will play a vital role in the eventual challenges encountered in rewilding projects and in determining how best to benefit them.

## Conclusion

Rewilding is a new conservation approach that has a lot of potential for restoring biodiversity and improving ecosystem services in degraded ecosystems. Rewilding will aid in the restoration of essential functions like carbon sequestration, water regulation, and soil fertility by introducing native species and reinstating natural ecological functions, and will also contribute to the recovery of species populations. The case studies, including the wolf reintroduction in Yellowstone and the beaver

reintroduction in the UK, demonstrate the beneficial effect of rewilding on the ecosystem structure and functioning and the regeneration of habitats and enhancement of biodiversity. Nonetheless, rewilding has a number of challenges that need to be overcome in order to be adopted widely, as it has potential. Ecological uncertainty pertains to how species will adapt, and the impact that such projects may have that are not planned; these are risks to project success. Social resistance complicates the implementation of rewilding, particularly in places where rewilding may be incompatible with local land use practices and financial constraints, such as the cost of rewilding at scale. To remove such hindrances, it is essential to focus on long-term surveillance and change management, where rewilding can be optimized in terms of the results of observation. Also, it is necessary to incorporate the concept of rewilding into the more comprehensive conservation efforts that would strike the right balance between ecological restoration and the socio-economic factors. Policy support, engagement of people, and financial instruments, including but not limited to public-private partnerships, could be used to get the required resources and political support to achieve successful rewilding projects. The research in the future should focus on the ecological and socio-economic consequences of rewilding on a long-term basis, specifically biodiversity recovery and acceptance in the community. In conclusion, even though rewilding as a policy of restoring the ecosystem and combating the loss of biodiversity presents a promising opportunity, it will need to be well-planned, researched, and applied at different

locations in order to be effective and sustainable enough to combat the global crises in the environment.

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