Re-establishing Natural Habitats Programme: A Catalyst for Biodiversity Restoration in Myanmar

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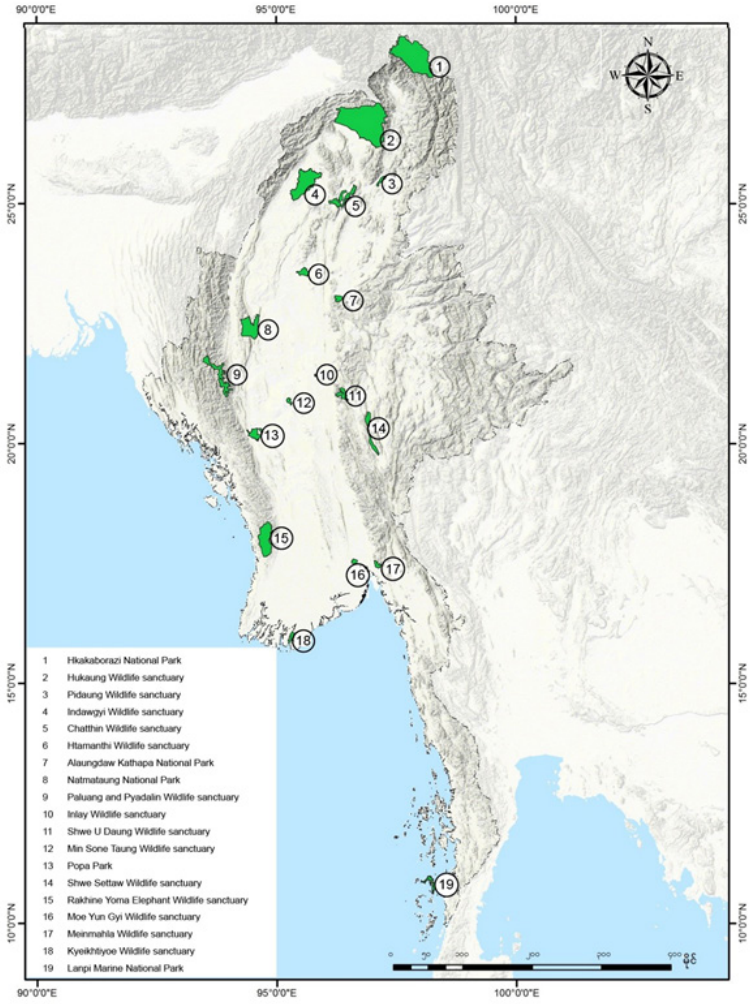

Figure 1. Location map of RNH implemented PAs

Introduction

Protected areas (PAs) play a pivotal role in the conservation of biological diversity, as these are homes to thousands of species, provide ecosystem services and help alleviate poverty [1]. Within a limited small-scale landscape, protected areas receive a high proportion of species and facilitate species' suitable range extension [2]. Consequently, countries aimed to expand their protected areas to conserve species and protect ecosystems. However, the effectiveness is being undermined by the lack of funding sources [1]. Just as small grant programs could fill the gaps in capacity building, research, and conservation agenda settings [3], governments and donors must take responsibility to upscale the management of PAs to prevent further declines of biodiversity in limited fragmented landscapes and the restoration of natural habitats.

Myanmar, located in the Indo-Burma biodiversity hotspot, is endowed with diverse ecosystems and precious biodiversity which are being conserved by the establishment of protected areas. Ongoing climate change, socio-economic development, urbanization and increasing human population negatively impacts the already declining ecosystem services. Thus, it is crucial to restore the natural habitats for effective biodiversity conservation and sustainable utilization of the ecosystem services [2,4]. Habitat restoration is a global priority in maintaining ecosystem services, conserving biodiversity, and combating climate change. United Nations declared the "UN Decade on Ecosystem Restoration 2021-2030" to implement ecosystem restoration as it is crucial in achieving the sustainable development goals. Thus, Myanmar government launched the Re-establishing Natural Habitat Programme (RNH) (2019-2020 to 2028-2029), to achieve its objectives to protect the ecosystems and biodiversity, and to fulfill its commitments to international conventions and programs such as the Convention of Biological Diversity (CBD), Paris Agreement and Sustainable Development Goals (SDG), and the Myanmar Sustainable Development Plan of 2018-2030 [5].

The long-term goals extend to the restoration of ecosystems which ensures the sustainable supply of ecosystem services, climate change mitigation, and which promotes public and stakeholder participation in ecosystem resiliency and biodiversity conservation. The main objectives of the RNH include developing effective protected areas management plans, sustaining the natural resources, ensuring that the conservation of ecosystems and biodiversity results in community development, enhancing community participation and fulfilling commitments to international agreement, programs, and conventions. Findings and outputs from surveys and activities obtained from the RNH will provide baseline data to upscale the effective management of PAs, and enhance restoration strategies and planning. The RNH is being implemented in 19 protected areas of Myanmar namely; Hkakaborazi National Park, Hukaung Wildlife Sanctuary, Pidaung Wildlife Sanctuary, Htamanthi Wildlife Sanctuary, Indawgyi Wildlife Sanctuary, Chatthin Wildlife

Sanctuary, Shwe U Daung Wildlife Sanctuary, Alaungdaw Kathapa National Park, Natmataung National Park, Min Sone Taung Wildlife Sanctuary, Panlaung and Pyadalin Wildlife Sanctuary, Popa Park, Shwesettaw Wildlife Sanctuary, Inlay Wildlife Sanctuary, Rakhine Yoma Wildlife Sanctuary, Moe Yun Gyi Wildlife Sanctuary, Kyeikhtiyoe Wildlife Sanctuary, Meinmahla Wildlife Sanctuary and Lanpi Marine National Park, respectively (Figure 1).

Implementation

The RNH is to be implemented according to conceptual model developed for each protected area (Figure 2).

The 10-year RNH invested about 5,188 million Myanmar kyats, and the evidence of progress and effectiveness are to be assessed through the department standard operating procedures on a monthly, quarterly, and annual basis. Under the umbrella of RNH, 13 main activities for the re-establishment (Table 1) and 15 main activities for the protection were set up to achieve the objectives (Table 2) [6,7].

Figure 2. Conceptual model of RNH

Table 1. Main activities for the re-establishment in RNH

No.	Activity
1	Improving wildlife corridors
2	Establishing gap plantations (Mangrove and animal food plant)
3	Establishing gap plantations (Mangrove and animal food plant)
4	Cleaning of weed and Eichhornia
5	Creating artificial salt licks for wild animals
6	Restoring pastureland for elephant, deer, hog deer, gaur, banteng, sambar, Myanmar star tortoise, birds
7	Building artificial resting places for birds
8	Conserving pastureland and nesting sites for birds
9	Establishing protected zones for fish breeding
10	Cleaning of *Mimosa pigra*
11	Measuring water depth and water quality
12	Soft release of Myanmar star tortoise
13	Establishing protected zones for coral reef

Table 2. Main activities for the protection in RNH

No.	Activity
1	Construction of patrol station (camp)
2	Patrolling
3	Boundary pillar construction
4	Installation of signboards
5	Education and awareness raising
6	Creating pamphlets, brochures and posters
7	Measuring and protection of springs and water headways
8	Construction of fire lines
9	Star tortoise inventory and survey
10	Fauna and flora inventory and surveys (wild elephant, tiger, bird, mammal, white browed nuthatch, Popa langur, crocodile, Eld's deer, insect, plant, marine species, amphibian and reptile, fish, tiger, takin and red panda, Ayeyarwady dolphin)
11	Shore protection for turtle
12	Distribution of fuel efficient cooking stove
13	Ecotourism enhancement
14	Archiving of plant and insect samples
15	Capacity building and training on surveys and sampling techniques

https://www.pexels.com/id-id/foto/tampilan-jarak-dekat-dari-tiger-247615/

Current major outcomes

The RNH has been implemented for two years and some of the main outcomes of the re-establishment activities include 76 ha of improving wildlife corridors, 60 ha of gap plantations (mangroves), 180 ha of gap plantations (forests and animal food plant), 104 ha of restoring wildlife pasturelands, and creating salt lick of 281 sites. The main protection activities include the construction of 1918 boundary pillars, 19 patrol stations, and distribution of 8232 fuel efficient cooking stoves (Figure 3).

Species surveys and recording were also conducted in all targeted PAs by park rangers and staff of Nature and Wildlife Conservation Division (Figure 3 and Supplementary). The Eld's deer (*Rucervus eldi thamin*) which is endemic to Myanmar was monitored in Shwesattaw Wildlife Sanctuary (SWS). Results showed that the population of Eld's deer was 952±440 (mean±SE) in 2019, 1106±359 in 2020, 653±244 in 2021, and 1368±359 in 2022. While in Popa Mountain Wildlife Sanctuary the estimated population of Popa langur (*Trachypithecus popa*) was 98 in 2020, 87 in 2021, and 90 in 2022. In Meinmahla Wildlife Sanctuary the recorded number of Crocodile (*Crocodylus porosus*) was 107 in 2019, 119 in 2020 and, 115 in 2021. From 2019 October to 2022 March, environmental education and awareness raising was conducted 326 times and the training was 16 times.

Although most of the activities contributed to better understanding of the species' habitat and their status, the government cannot afford to successfully operate such activities due to limited availability of funds for conservation. Nevertheless, in the current implementation of RNH, several effectiveness and weakness also emerged (Figure 4). The SWOT analysis suggested that strength and opportunities found in the analysis can be incorporated in future activities and related strategies. Significant weakness and threats indicate that the implementation of RNH still needs to consider some potential and unprecedented causes of climatic and anthropogenic factors. In addition, those weaknesses pointed out the need for further inputs in such activities.

Figure 3. Implemented activities of RNH

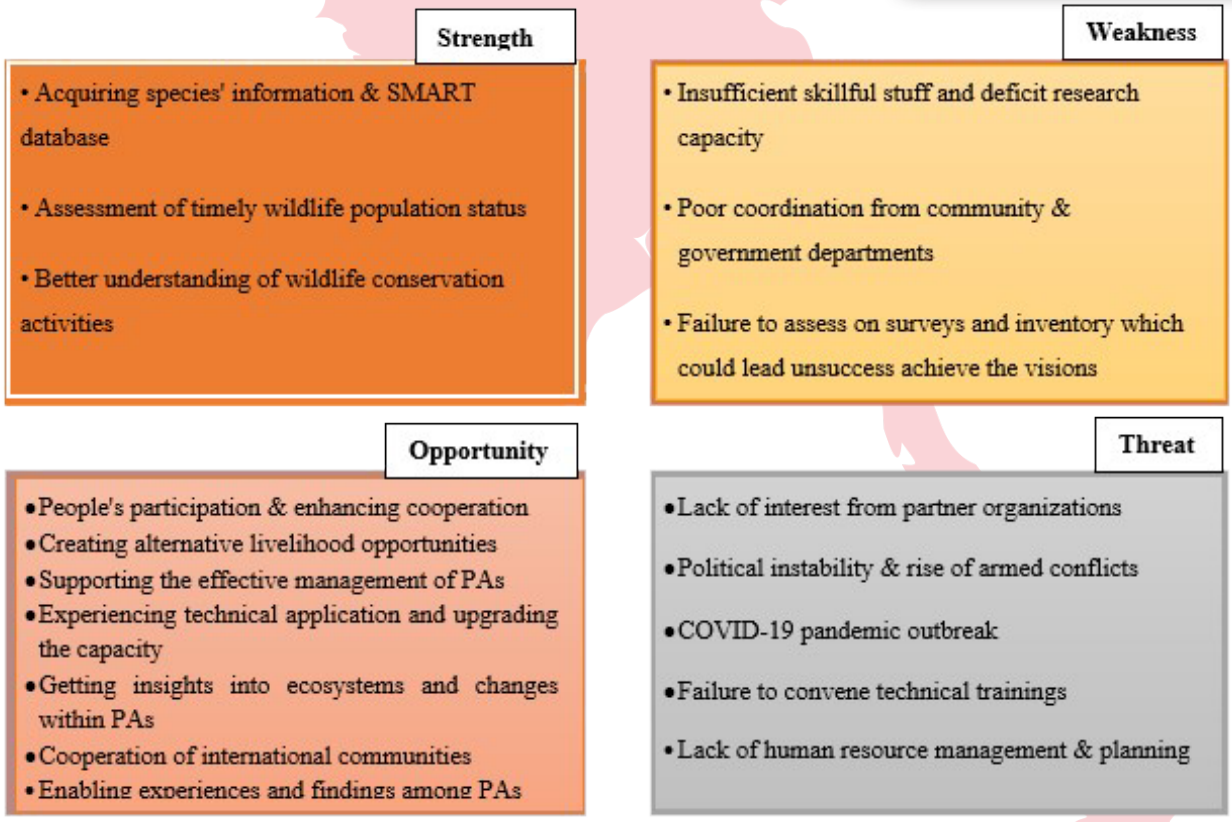

Figure 4. SWOT analysis on RNH

Conclusion

Conserving protected areas (PAs) are of utmost importance in maintaining biological diversity, and sustaining diverse ecosystems. Hence, effective management of PAs is crucial in this age of species extinction. Investing in the restoration and management activities of PAs is a wise move in saving the biodiversity and nature, as a whole. The RNH program highlights the contribution of grants and investments that can leverage the re-establishment and rehabilitation of habitats, and protection activities in PAs.

Although the RNH is a grant-oriented program, some weaknesses are detectable. To implement the activities successfully and achieve the goals, program should emphasize the need for skillful and efficient staff, and for enhancing cooperation of local community, concerned entities and related departments. The authors, therefore, recommend for the consideration of potential threats and weakness in the implementation operations to facilitate the effective and efficient achievement of the targeted goals. The role of protected areas reaches far more than the conservation of biodiversity and ecosystems, as PAs also contribute in carbon trade off and the Nationally Determined Contribution-NDC and Sustainable Development Goals. Therefore, effectively managing and restoring the natural habitats not only achieve the goals of conserving biological diversity and ecosystems, but also help in combating other environmental problems and menaces.

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