

RESTORATION, RECLAMATION AND REHABILITATION OF DEGRADED FOREST AREAS IN PENINSULAR MALAYSIA: ISSUES, CHALLENGES AND WAY FORWARD

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ABSTRACT

The Restoration, Reclamation and Rehabilitation of Degraded Forest Areas in Peninsular Malaysia Program (3RSM) was implemented in the Eleventh Malaysia Plan (RMK-11) and continued in the Twelfth Malaysia Plan (RMK-12). The 3RSM Program is a high-impact project to restore degraded forest areas due to natural disasters such as floods, landslides and other anthropogenic impacts with the planting of suitable local forest tree species. The 3RSM Program also supports the Malaysia's Greening Agenda and the country's international commitment to maintain at least 50% of our land mass under forest cover as pledged at the 1992 Earth Summit in Rio de Janeiro, Brazil. It is a long-term action to ensure the conservation and preservation of the national forest continuously in line with Sustainable Development Goals (SDGs) and the requirements of Sustainable Forest Management (SFM). After going through various issues and challenges in the implementation of the 3RSM Program, a lot of experience and lessons learned has been successfully collected to be used as a reference and way forward for improving its implementation in the future. The main issues and challenges faced in the previous implementation such as project implementation problems at site, monitoring problems, lack of new technology and innovation in project implementation and the absence of a specific silviculture regime for the 3RSM Program will be given more specific emphasis and priority with find the best solution in terms of continuously increasing adequate allocations, establish a silviculture regime for the restoration of degraded forest areas and explore new technologies and innovations that are viable and creative to be able implementation and monitoring in the field effectively in terms of time, cost and manpower in the future. All this effort through the 3RSM Program is very significant to realize and achieve the net zero carbon target by 2050 and all degraded forest areas are restored and return to the climax ecosystem for the well-being of life.

Key words: 3RSM Program, degraded forest areas, natural disasters, anthropogenic impacts, planting of suitable local forest tree species, Sustainable Development Goals, Sustainable Forest Management, issues and challenges, way forward, net zero carbon target by 2050, return to climax ecosystem, well-being of life.

INTRODUCTION

Malaysia is one of the most biological diverse country in the world. The unique condition of its climate, geological and geographical history have given rise to highly diverse ecosystem and is extremely rich in plant and animal species due to widely variety of natural terrestrials and aquatic ecosystems. However, widespread deforestation and declining condition of the forests have resulted in environmentally, economically and aesthetically impoverished landscapes. To some extent the effects of deforestation and loss in forest quality have been offset through natural regeneration of forest and the establishment of planted forest. However, much of the regenerated forest consists of a few species designated to yield one or two products rather than seeking to produce a broader range of forest goods and services that will also contribute to the well-being of local communities.

Conventional approaches to plantation forestry are seldom capable of delivering the multiple values of forests and adequately addressing the needs of all interest groups (e.g. forest-dependent communities and downstream water users). Indeed, such schemes can result in a reduction in the range, quality and volume of forest goods and services, social and economic dislocations and an increased vulnerability to climate change and other natural perturbations. There is an urgent need to both improve the quality of forest restoration and

rehabilitation at the site level and to find effective ways to undertake these activities in the context of broader environmental, social and economic needs and interests.

The natural disaster at the end of year 2014 worsen the environmental quality affected by the mud floods and landslides occurred in Cameron Highlands and Janda Baik, Pahang and also occurred in Kuala Krai and Gua Musang, Kelantan. These natural disasters have caused loss of life, property damage, economic loss and environmental destruction. Based on the 2014 Flood Disaster Forensic Special Committee Report, the natural disaster has caused a loss of RM2.8 billion and involved a total of 300,000 victims.

Malaysian Government has taken the initiative to prevent similar incidents from happening again by approving the Restoration, Reclamation and Rehabilitation of Degraded Forest Areas in Peninsular Malaysia Program or in short refer as 3RSM Program under the 11th Malaysia Plan with an allocation of RM100 million. The Cabinet of Malaysia has given approval to the Ministry of Natural Resources and Environment to implement the 3RSM Program through its agency, Forestry Department of Peninsular Malaysia to realise this program.

Beside that, there are other significant initiatives took place to halt the natural disaster and minimising environmental impacts such as Ecological Linkages Networks through Central Forest Spines Project and Management of Peatland Project.

Forest Resources In Peninsular Malaysia

The area of forested areas in Peninsular Malaysia is 5,743,546.11 hectares which is 43.56% of the land area in Peninsular Malaysia. Of that amount, 4,848,448 (36.80%) hectares have been gazetted as Permanent Forest Reserves (HSK), while the remaining 873,843 (6.63%) hectares are Government Land Forest, Wildlife Protection Forest and other forested areas.

International Commitment

At the Earth Summit in 1992, Malaysia pledged to keep at least 50% of its land as forest cover. To date, Malaysia has fulfilled the pledge and still continuously striving to maintain it. In 2009, during the 15th Conference of Parties of The United Nations Framework Convention on Climate Change (COP 15 UNFCCC) in Copenhagen, Malaysia maintained its commitment to ensure that at least 50% of its landmass area remains forested as a pledge made at the Rio Summit and again in 2022 at 27th Conference of Parties of The United Nations Framework Convention on Climate Change (COP 27 UNFCCC) in Sham El-Sheikh, Egypt, Malaysia has consistently maintained more than 50% of its landmass as forest following its voluntary pledge at The Earth Summit in 1992.

The implementation of the 3RSM Program is seen to be able to help maintain at least 50% of the Malaysian land area as forest and tree cover and ensure that the Sustainable Development Goals (SDGs) agenda is achieved. The implementation of the 3RSM Program is based on SDG 15: Life on Land. Sustainable Development Goal 15: Life on Land (SDG 15) is one of the 17 Sustainable Development Goals established by the United Nations (UN) in 2015, with the official description being: "Protect, restore and promote the use of terrestrial ecosystems, manage sustainably, combat desertification, and halt and reverse land degradation and halt the loss of biodiversity.

In this decade of action to deliver the Sustainable Development Goals, and as we prepare to launch the Decade on Ecosystem Restoration, every effort must be made to ensure that sustainable forest management is fully integrated into both short-term crisis response and long-term green recovery strategies. We need to set the bar high and look beyond the current emergency towards truly sustainable and scalable development solutions. Forests play a vital role in fighting climate change and sheltering biodiversity and homes for Indigenous communities.

Malaysia Forest Governance

Malaysia is a very fortunate country to have natural tropical rainforests that are rich in diversity biological resources. These tropical forests are priceless national treasures that provide natural habitats for flora and fauna, ecosystem services and products. Sustainable forest management is a holistic approach that involves factors such

as ecological balance, economic and socio-cultural related to forests. It also includes aspects of protecting biodiversity, ecosystems so by forests, and mitigation measures of some of the effects of climate change. Therefore, the forest should be evaluated not for the purpose of the wood alone.

Forest management and preservation is the collective responsibility of the Federal and State Governments. According to the Federal Constitution, forests are under the jurisdiction of the State Government and each state is responsible for enacting policy and respective forest laws. The executive power of the Federal Government is only limited to providing advisory services and technical assistance, training and conducting research. In addition, the National Land Council was created under the Federal Constitution is a platform for the Federal and State Governments to discuss matters related to forestry policy and forest management in Malaysia.

Malaysia's Forestry Policy is a policy at the national level based on the principles of natural resource conservation. Malaysia has updated its forestry policy in line with new trends and international obligations. Malaysia's Forestry Policy has been designed based on the principles of sustainable development. Sustainable Forest Management is a theme underlying this policy. It will ensure that the forest activities carried out provide benefits from a social aspect, environment and economy, as well as balancing various needs for development while preserving and enhancing forest function. Malaysia's Forestry Policy is a significant achievement. It combines the principles of forestry in the province Peninsular Malaysia, Sabah and Sarawak while still maintaining the interests of each region. This policy shows the commitment of all parties in protecting, managing and conserving natural resources for future generations. The inclusion of the forestry policies of the three regions covering Peninsular Malaysia, Sabah and Sarawak underlines the joint commitment towards achieving sustainable development.

Malaysia has also taken commendable steps to protect its biodiversity with the formulation of various policies and legislation such as the National Policy for Biological Diversity 2022-2030, Forestry Policy of Peninsular Malaysia, 4th National Physical Plan, Second National Mineral Policy 2009, National Forestry (Amendment) Act 2022, Wildlife Conservation (Amendment) Act 2022, National Parks Act 1980, Biosafety Act 2007 and others.

FOREST LANDSCAPE RESTORATION PROGRAM IN PENINSULAR MALAYSIA

According to IUCN 2024, Forest Landscape Restoration (FLR) is the ongoing process of regaining ecological functionality and enhancing human well-being across deforested or degraded forest landscape. Forest landscape restoration has a proven track record in restoring key goods and services and improving the livelihoods of local people. FLR brings barren and degraded areas back to life. Not only does this restore biodiversity and revitalize local communities, it also contributes to climate change mitigation.

Currently, FLR is seen as very important in restoring forest areas destroyed by natural disasters such as tsunamis, floods, landslides, forest fires, forest encroachment and other anthropogenic factors. Uncontrolled land use factors and land use conversion for non-forestry purposes are the reasons why FLR is so important and needs to be implemented. Efforts to implement FLR will be able to overcome forest fragmentation and forest degradation, provide protected areas for wildlife with ecological linkages networks and for human well-being due to population increasing.

In Peninsular Malaysia, FLR initiatives and efforts to restore forest or land areas are being carried out with plans by the government through the cooperation of the central agencies, state agencies, private sector and non-governmental organizations. FLR initiatives and efforts that is being implemented through four main programs, namely the Planting Program with Mangrove and Other Suitable Tree Species Along National Coastline, which was started in 2005, the Central Forest Spine (CFS) ecological corridors which began in 2010, the Restoration, Reclamation and Rehabilitation of Degraded Forest Areas Program in Peninsular Malaysia which began in 2016 and Peat Swamp Forest Rehabilitation and Conservation Project. All the programs that are being implemented involve the restoration and preservation of ecosystems with the main activities being large-scale tree planting in forest landscapes, coastal landscapes and within ecological corridors. This effort has supported the Malaysian Greening Agenda, the 100 Million Tree Planting Campaign being carried out by the Malaysian Government from 2021 to 2025.

The ASEAN Green Initiative (AGI) at a recent ecosystem forum, bestowed recognition to Central Forest Spine (CFS), an initiative under the Forestry Department Peninsular Malaysia, for its efforts in habitat and biodiversity resources restoration. The AGI Award given to Malaysia acknowledges CFS's efforts to identify areas to plant 32,000 trees as of 2022, connecting fragmented forest landscapes in Peninsular Malaysia. This is in addition to the 143,560 native trees planted from 2013 to 2015. The AGI was established to conserve the region's rich biodiversity, to set the standards for the best ecosystem restoration activities, regrow the forests in the region as well as contribute positively to both humans and wildlife. CFS's rehabilitation effort of ecological corridors is aligned with ASEAN's mission to plant 10 million native trees within a span of 10 years. The Forestry Department Peninsular Malaysia is honoured to receive this recognition for its forest restoration and connecting the forest landscape in Central Forest Spine.

Recognising the importance of the forest as it heavily impacts the lives of trees, wildlife and humans, CFS has taken on the responsibility to carefully link 39 ecological linkages connecting fragmented landscapes throughout Peninsular Malaysia. This crucial conservation project not only paves the way for the sustainability of the nation's lush resources and heritage, but also ensures the survival of endangered species, the conservation of rich biodiversity and the preservation of key habitats.

One of the flagship projects is the Central Forest Spine (CFS), which focuses on reconnecting fragmented forest habitats across Peninsular Malaysia. This initiative not only enhances biodiversity but also boosts carbon sequestration capabilities. By 2023, Malaysia's efforts in mangrove and forest conservation have contributed to the reduction of approximately 100,000 metric tons of CO₂ annually. Additionally, significant new activities include planting 100 million trees since 2021 as part of extensive reforestation efforts.

Malaysia has emerged as a proactive player in the global fight against climate change, committing to achieve net zero emissions by 2050. A significant aspect of Malaysia's strategy revolves around nature-based solutions (NBS), which leverage the country's rich biodiversity to reduce carbon emissions and enhance environmental sustainability. Malaysia's mangrove forests, spanning over 500,000 hectares, are crucial carbon sinks. These ecosystems sequester carbon up to ten times more efficiently than terrestrial forests, making them vital in the fight against climate change. The government has launched several initiatives to conserve and restore mangroves, aiming to protect these valuable habitats from degradation and deforestation.

Malaysia's nature-based solutions are a critical component of its net zero strategy. Through forest conservation, REDD+ initiatives, carbon markets, and community engagement, Malaysia is making meaningful strides towards a sustainable future. As these projects expand, the nation is poised to become a leader in climate action, demonstrating the power of nature in mitigating climate change.

Malaysia's commitment to leveraging nature-based solutions is a promising pathway towards achieving net zero emissions. With continued investment and collaboration, these initiatives are set to make a substantial impact on carbon reduction while preserving the country's rich biodiversity. By 2050, Malaysia aims to enhance its natural carbon sinks significantly, contributing to global climate goals and setting a precedent for other nations to follow.

Shared Learning of Implementation 3RSM Program In Peninsular Malaysia

At the end of the year 2014, Malaysia was awakened by the incident of the mud floods and landslides in Cameron Highlands and Janda Baik, Pahang and in Kuala Krai and Gua Musang, Kelantan. These natural disasters have caused loss of life, property damage, economic loss and environmental destruction. Based on the 2014 Flood Disaster Forensic Special Committee Report, the natural disaster has caused a loss of RM2.8 billion and involved a total of 300,000 victims.

The Malaysian Government has taken the initiative to halt similar incidents under the Restoration, Reclamation and Rehabilitation of Degraded Forest Areas in Peninsular Malaysia Program or in short referred to as the 3RSM Program under the 11th Malaysia Plan with allocation of RM100 million. The Cabinet of Malaysia has approved the Ministry of Water, Land and Natural Resources (now Ministry of Natural Resources,

Environment and Climate Change) to implement the 3RSM Program through its agency, Forestry Department Peninsular Malaysia to realize this program.

The 3RSM program in Peninsular Malaysia began with the identification of degraded forest areas in a permanent reserve forest spanning around 4,750 hectares based on satellite imagery and further the target of restoring an area of 1,640 hectares was approved by the Ministry in the year 2016 to be implemented. On 15th March 2017, the Economic Planning Unit of Prime Minister Department approved the changes of 3RSM Project Scope which enables the project to be implemented not only in PRF but also outside PRF. The changes enable FDP to carry out planting activities in all ex-natural disaster's areas throughout Peninsular Malaysia.

In the Eleventh Malaysia Plan, out of 1,640 hectares forest degraded lands, 810 hectares were successfully planted with 462,256 trees. With the continuing of 3RSM Project under Twelfth Malaysian Plan, an allocation of RM52 million was approved to restore the remaining 830 hectares of forest degraded lands. Until September 2024, an area of 1,235 hectares of forest degraded lands were restored with 731,176 trees of various species and, an area of 1,235 hectares were silviculturally treated.

ISSUES AND CHALLENGES

The implementation of the 3RSM Program is always faced with challenges, especially in restoring degraded forest areas. Among the main challenges faced in the implementation of restoration of degraded forest areas are:

- (a) The remote and hilly location of the degraded area and the difficulty of road access;
- (b) The condition of the planting area that is filled with residues from agricultural fields;
- (c) The difference in the level of deterioration of forest quality for an area;
- (d) Species-site matching;
- (e) Lack of supply of planting materials from high quality local species;
- (f) Prolonged dry season and rainy season;
- (g) The occurrence of natural disasters that affect restored and rehabilitated areas;
- (h) Disturbance and vandalism by humans in restored and rehabilitated areas;
- (i) Disturbance by wildlife and animals grazing in restored and rehabilitated areas;
- (j) Disease and pest on seedlings in nurseries and seedlings that have been planted

WAY FORWARD

Financial Resources For Forest Landscape Restoration Program

The implementation of FLR mostly financed under five year Malaysian Plan Budget. Additional funds are also secured through international cooperation such as the Global Environment Facility (GEF) supported by the United Nations Development (UNDP) under the project entitled Improving Connectivity in the Central Forest Spine (IC-CFS) in the states of Perak, Pahang and Johor. Furthermore, under Greening Malaysia Campaign, few local corporate bodies such as Petronas, Tenaga Nasional Berhad and Nestle altogether are major contributors to 100 Million Trees Planning Program. Nevertheless, more funds and contributions from private entities are welcomed to join hand together with the high sense of responsibility for FLR and for sustainable use of the earth's ecosystem.

In Malaysia, the introduction of the Ecological Fiscal Transfer (EFT) mechanism was in part supported by the United Nations Development Program-Biodiversity Finance Initiative (UNDP-BIOFIN) and took several years of preparatory work. The Government of Malaysia introduced the EFT in 2019 and 2021 with a combined budget allocation of RM130 million to all states for protecting and expanding natural forest reserves and protected areas. Recently, the Government announced the increased EFT allocation up to RM70 million for 2022 and committed to provide funds annually. In the 2024 Budget announcement, the EFT allocation increased to RM200 million, an increase of RM50 million compared to the 2023 allocation. It demonstrates a strong political will from the Federal Government to incentivize the States in biodiversity conservation.

To encourage more companies to join the voluntary carbon market, the government proposes tax exemption an additional RM300 million was awarded to the company to make expenditure on Measurement, Reporting and Verification (MRV) related to the development of carbon projects. These expenses are deductible from the sale income of exchange-traded carbon credits at the Bursa Carbon Exchange (BCX). The Federal Government will spearhead the issuance of biodiversity sukuk up to RM1 billion involving replanting degraded forests that will generate carbon credits.

The announcement by Malaysia Prime Minister, during the presentation of Budget 2023, regarding “Wakaf Madani” which includes assets worth more than RM1 billion is very welcome. This effort is not only for the benefit of the people but can be expanded for environmental conservation efforts. Therefore, the effort to use waqf instruments in environmental conservation needs to be explored more widely, not to mention in the current situation where the human environment is burdened with various environmental problems whether local or global in nature such as climate change, haze, acid rain, pollution water, soil, waste problems and so on. Currently, there are various forms of natural resource waqf such as forest waqf, water waqf, solar energy waqf and so on. Endowment of natural resources for mutual benefit is not a new thing.

In the context of the modern world, natural resource endowment is also practiced by many countries. For example, in Turkey, there is a forest endowment (Evkaf Forest) that covers an area of more than 107 thousand hectares. While in Indonesia, the first waqf forest was developed in Aceh and was known as Jantho Waqf Forest. In Malaysia, Water Waqf has been introduced to finance small-scale water service projects. The Green Mosque Waqf was introduced to finance mosque development projects based on green technology. Based on the example above, it is clear that endowment of natural resources is not something foreign to the Muslim community around the world.

Improved Planting Material

The best level of productivity can be achieved when the genetics and physiology of the species are well matched through studies and research that can produce fast and encouraging growth rates. Researchers need to study and propose high-value improvements in important traits such as disease resistance, stem shape and quality wood density to ensure healthy growth through high-quality selection and breeding techniques. The main constraint, seen at present, is the lack of good planting material for various planting programme. Quality seeds and the production of trees that have been selected and propagated vegetatively are insufficient to meet current and projected needs in supporting various forest tree planting activities. Efforts are currently being made to overcome this kind of problem by empowering research and development and increasing the production capacity of high-quality plant material in nurseries.

Smart Forest Landscape Solution (Smart FLR)

Smart FLR Solution provides Silviculturist with remote monitoring and control capabilities, soil crop matching analysis, Optimize fertilizing, weeding, diagnose crop health and mortality rate.

- (a) IoT Sensor For Real-Time Monitoring
Monitoring environmental parameters and crop health in real-time, empowering sylviculturist with valuable insights to optimize silviculture practices.
- (b) Artificial Intelligent (AI) Analysis And Prediction
Machine learning and AI will provide precise crop health analysis, valuable tren insights, and semi-automated weeding and fertilizing process.
- (c) GIS System For Informed Field Management
Combining GIS with mutiple sensores may achieve accurate saptial mapping of fields, planing and mapping, enabling well-informed decisions, survival rate census, monitoring and silviculture treatments activities.

CONCLUSIONS

The Restoration, Reclamation and Rehabilitation of Degraded Forest Areas in Peninsular Malaysia (3RSM) program is a high-impact national project that supports the Greening Agenda and fulfils the country's international commitments in ensuring that at least 50% of forested areas can be maintained. It is a long-term action to ensure the conservation and preservation of the national forest continuously in line with Sustainable Development Goals (SDGs) and the requirements of Sustainable Forest Management (SFM).

The implementation of the program led by NRES through FDPM involves a network of collaborations from various agencies consisting of Government Departments/Agencies, research institutes, non-governmental organizations and the public. Research, Development, Innovation and Commercialization is an important aspect to ensure that improvements and innovations can be carried out continuously to support the efforts to restore degraded forest areas.

The implementation of this program remains relevant to ensure that the conservation and preservation of national forests can be implemented consistently for the well-being of the people. Therefore, the 3RSM program needs to be continued in the 13th Malaysia Plan (2026 - 2030) until it achieves the set goal of restoring the degraded forest areas in Peninsular Malaysia.

CONCLUDING REMARKS

Forests are part of human life and shall meet the people's aspirations in the present and future. Good governance of forest landscape restoration and policy framework are paramount to ensure that forests are sustainably managed as well as addressing relevant issues according to new world order and living in harmony with nature.

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