The Unseen Flood: Waterlogging in Large Oil Palm Plantations

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INTRODUCTION

Oil palm was first introduced to Malaysia in 1870 as an ornamental plant by the Dutch. Originally a native plant in Africa, the crop thrive excellently in our tropical climate and soil. It was soon recognised as a potential plantation crop to yield edible oil in 1917 and before long, flourished to over 500 million trees in the country today. Oil palm covers about two million hectares, or a third of the total cultivated area, equivalent to some 10% of national land use. Being the leading agricultural crop in Malaysia, the industry is backed by numerous research and development works carried out by various private and government agencies. These have all contributed greatly in grooming the sector to its present glory, accounting for 51% of world palm oil production and 62% of world exports [1].

The statistics as highlighted above is overwhelming and, at the same time, alarming. *With great power comes great responsibility*. As the biggest producer and exporter of palm oil and palm oil products, Malaysia surely has an important role to play in fulfilling the long-term sustainability of palm oil production.

THE GAP

Despite the great achievement mentioned above, there is in fact a significant gap between the average national yield per hectare and the genetic potential yield of oil palm. Henson [2] showed that there is a stunning 50% difference between average national yields and experimental yields. It is anticipated that a 20% improvement in annual production would be equivalent to the output from more than 400,000 hectares of newly-cultivated land. Therefore, the effort towards increasing the current yield potential of oil palm crops has become a major concern.

WATERLOGGING PREDICAMENT

Studies carried out by the United States Department of Agriculture (USDA) on Malaysia palm oil production indicated a relationship between rainfall and palm oil yield. It was noted that rainfall close to the national average rainfall (normal rainfall) supports the palm oil output, whereas excessive rainfall, especially during the fourth quarter of the year would likely have a negative effect on palm oil production [3,4]. Oil palm can withstand temporary flooding provided that the water is not stagnant. Nevertheless, many plantations have experienced circumstances where water is logged within the estates for an extended period of time after the wet season, particularly on relatively flat terrain. This damages oil palm trees. Depending on the topography, waterlogging may rise to a few meters deep, covering over hundreds of acres and it may last more than a few months. The problem is indeed not unique to Malaysia. India, for example, also suffers from crops lost during its monsoon period from June to October every year due to surface waterlogging [5,6].

Most estates do not have experts who are well-versed in drainage behaviour of large plantations. Remedial works are carried out on an ad-hoc basis by digging additional or larger drains, adjacent to the affected areas, in order to alleviate the flooding without a comprehensive study of the entire catchment. Such changes on the ground surface alter the flow path and may cause the water mass to simply migrate to a new position, inundating another area to a larger or smaller extent. The same could happen during the replanting exercise when the old crops are felled and the estate topography is drastically altered. In addition, extensive soil loss takes place and the sediment deposition further reduces the capacity of existing drains. The problem evolves from bad to worse after every cycle of replanting.

A trained civil engineer will recognise immediately that this is a simple issue with no simple solution. Good drainage requires adequate gradient but is difficult to attain over a large area where oil palms are typically planted on existing terrain with the natural features of reliefs and elevations. Civil engineers have learnt to promote infiltration to reduce surface runoff but the approach has no merit when the water table is above the ground surface after the monsoon. It is evident that we have limited technical know-how to resolve a problem of this nature, which is barely covered in our *Manual Saliran Mesra Alam* (MSMA) intended primarily for urban drainage planning.

PRIVATE ISSUE OR PUBLIC CONCERN?

The chronic waterlogging problem leads to lower yield in the affected estates generally, and it incurs financial losses from year to year. Ironically, most estates operators are willing to compromise on cultivating the sub-optimal land and risk periodic losses on oil palm production. The increasing demand of palm oil worldwide is met mainly by increasing the total planted area of oil palm [7]. It was reported that the total oil palm planted area in Malaysia has increased by 1.9% in 2004, in relation to the rising demand [8]. From the 1990s to the present, the area under

palm oil cultivation around the world had increased by about 43%, most of which are in Malaysia and Indonesia [9]. The fact is that a lot of local operators are venturing out to the neighbouring countries in search of new land due to the shortage within our country. Yet, the same drainage problem prevails.

Owing to the fact that flood water is confined within private land and do not pose any threat to the general public, waterlogging in plantation is not considered as a civil issue. It is thus not surprising that it is not getting the attention it deserves. Nevertheless, cultivating larger land area to compensate for the lower oil palm productivity is definitely not the solution. Gone are the days when human beings can treat nature as an infinite provider of natural resources, instead, we have to recognise the fragility of Mother Earth and the scarcity of resources.

Development of new plantations has resulted in the conversion of large areas of forests with high conservation value and it has threatened the rich biodiversity in these ecosystems. The rampant land clearance has led to several environmental problems, particularly flooding, erosion, water pollution and destruction of wildlife habitat. In fact, forest clearance activities have also been allegedly responsible for forest fires, a source of our country's recent woes when Peninsular Malaysia was virtually shrouded by thick hazardous haze leading to the declaration of a state of emergency in two towns. According to the Malaysian Palm Oil Production Council (MPOPC), earth-friendly measures are to be adopted for the conservation of soil and water quality in plantation development [1]. The questions remain as to how meticulous is the guideline and how well it is implemented and enforced. The expansion of oil palm plantations has also given rise to social conflicts between the local communities and project proponents in many instances.

THE THREAT – THE OPPORTUNITY

Based on current trends, the oil palm industry is set to continue its growth in order to satisfy global demand. However, it is imperative that the expansion must be done in a sustainable manner. To ensure that this happens, the World Wildlife Fund (WWF) has taken the initiative in 2001, leading to the establishment of the Roundtable on Sustainable Palm Oil (RSPO) in April 2004, in order to promote sustainable production and the use of palm oil. It is anticipated that in the near future, a set of stringent requirements will be imposed on palm oil exporters to penetrate the upmarket, particularly the European Union (EU).

Being the largest palm oil exporter, Malaysia will inevitably be dealt the heaviest blow should the international market join forces to demand better conservation practices. We should not be over-optimistic regarding the fact that buyers would opt for our product or that we would still have a majority of the Third World market, bearing in mind that palm oil is facing direct competition with soy oil, which is produced mainly in South America.

While it is not feasible to force individual estates to appoint specialised consultants to resolve the waterlogging predicament, more related research and development can be carried out to advance the knowledge and understanding of large plantation hydrology. Estate operators must be educated on the importance of these studies so that their cooperation can be sought and access to relevant information and these estates would make it possible for site inspection and monitoring. Modeling tools should be developed to facilitate the prediction of when, where and how long waterlogging would occur. Using these tools, proposed solutions may be simulated to evaluate their efficiency. With these simulations, it is then possible to derive the most cost-effective measures to minimise the adverse effects of waterlogging. In India, for instance, remote sensing has been used to study and monitor waterlogged area during the monsoon season. Management models are also proposed and developed to reduce yield losses [8,9].

In addition, detailed guidelines and planning procedures associated with plantation development must be established to reconcile agricultural practices with the need for environmental conservation. Of particular importance in this respect are drainage design procedures and best practices for soil loss control, not to mention environmental impact assessment and wildlife protection. The enforcement must be checked and its effectiveness evaluated for improvement. If we can uphold a high standard, then there should be no worry of strict external demands.

SUMMARY

Prime Minister Datuk Seri Abdullah Ahmad Badawi has emphasised the importance of the agricultural sector to the Malaysian economy. We shall thus not take our present success in palm oil export for granted but continue to strive for excellence. Bridging the gap between the actual yield and the potential yield of oil palm production is an important step towards palm oil productivity and in a larger sense, environment sustainability. Waterlogging in large plantations, an unseen flood to the general public, is a technical issue within the expertise of a civil engineer, who can, through extensive study of problems of the same nature, provide a creative solution which is financially viable. While we persistently claim that '*Malaysia Boleh*', let us be a true leader in this arena and not just a follower. ■

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