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# Leaning towards safety of slopes

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Like everything else in life, slopes need maintenance and it

**M**ALAYSIA is blessed with few natural disasters, resulting in complacency when dealing with the two natural ones that strike us the most — floods and landslides.

Inevitably, the two are interrelated. Landslides are usually triggered by prolonged rainfall. The recent landslides in Kampung Terusan in Lahad Datu that killed two people and the road collapse in Ranau along the Kota Kinabalu-Sandakan road remind us that even an isolated heavy rainfall that occurs outside its season may still be a threat to lives and property.

That is the reason why public awareness and education on landslides have to be continuously carried out, especially for the people who live in landslide-prone areas.

JKR has been embarking on landslide awareness and education programmes since 2007. This is in line with the National Slope Master Plan (NSMP) that has been approved by the Cabinet in August 2010.

The NSMP is a comprehensive strategic plan that covers areas as diverse as policy and institutional framework; hazard assessment and mapping; landslide warning and real-time monitoring systems; information collection, interpretation, dissemination and archiving; loss assessment; training; public awareness and education; loss reduction measures; emergency preparedness; and research and development.

Complete with strategic directions, action plans and key performance indicator measures, the NSMP helps planners set priorities on what needs to be done to stem the increasing tide of landslides.

Public awareness and education (PAE) is one



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of the components in the NSMP. The PAE programmes are supported by the Works Minister who believes that a knowledgeable public will be more aware of their surroundings and are more likely to take precautions whenever they notice signs of landslides.

Other programmes that have been conducted include outreach activities and talks to the communities as well as infomercials through the mass media.

One of the most important groups that have been targeted are the communities at-risk areas.

Another target group that is also equally important are the local authorities. They are the only government body with the charter to enforce safety guidelines and by-laws and engage in maintenance measures.

Because they are the first line of contact with the residents, it is crucial that the engineering departments of the authorities are well-trained and well-equipped.

The campaign has to be followed with action by the public and quick and effective responses from the local authority. There is generally a misconception by the people who reflect the belief that the Government is responsible for all their slope woes.

While in a few cases this may be true, in most cases developers and the professionals who certified the design and construction

is the responsibility of all to ensure this.

quality and finally the certificate of completion and compliance should be taken to task should untoward problems occur.

Furthermore, for private slopes, responsibilities fall onto the owner to ensure the safety of the slopes after construction. This means the owners are supposed to individually or collectively inspect, maintain and repair their slopes.

After a slope has been constructed, the owner has to make sure the professional engineer provides a slope maintenance manual that is tailor-made for that particular slope.

The importance of slope maintenance cannot be over emphasised. Everything in life usually requires maintenance. This is all the more so in the case of slopes since they are exposed to adverse weather conditions that cause weathering and weakening of the slope materials as time goes by.

For man-made slopes, the life cycle of a slope is largely determined by its planning, design, construction and maintenance. Each stage is strongly related to the other and will have a bearing on the maintenance stage, which is not only the longest but certainly the most essential part of the life of a slope.

For example, if a slope is to be built in a landslide-prone area (based on records, literature study, aerial and satellite mapping, and others), the decision will most certainly have to factor in a thorough site investigation that may include among others geological study and rigorous material testing.

In certain circumstances, the design has to have a higher factor of safety to cater for the many uncertainties inherent in the geology of the area. The resultant effect would be an increase in cost of construction and possibly

the cost maintenance as well.

Slope safety is everyone's responsibility. Any member of the public who sees signs of landslides on public property should report these to the relevant authority, and it is incumbent upon the authority to at least inspect the site and, if funds are available, repair it.

If not, the authorities should provide warning by posting up advisory signs or even cordoning off the area. It is also necessary for local authorities to communicate with affected residents, as concern for personal safety is usually high, regardless of the hazard or risk level.

For local authorities that do not have expertise on slope engineering, the Slope Engineering Branch of JKR is always willing to provide technical support with the assistance from Jabatan Mineral dan Geosains (JMG) and Jabatan Kerajaan Tempatan (JKT).

Similarly, individual slope owners should ensure that the slope is safe not only for their houses, but also for the neighbours. This can be done through periodic inspections and maintenance as specified in the "Guidelines on Slope Maintenance in Malaysia" that has been produced by JKR.

The need to follow guidelines has been reiterated in JKR's public awareness and education programmes for inspection and maintenance, and we are optimistic that with time, good practices for slope engineering will become more widespread with increased awareness and follow-through on actions and measures by all of us.

> Datuk Mohd Noor Yaacob is an engineer and the director-general of the Public Works Department. He welcomes comments to his e-mail.



A common sight after a downpour: Taking care of the environment, even to ensure landslides do not occur, is everyone's responsibility. If the laid-back attitude is to continue, things will get worse like this rockslide that occurred after a downpour in Taman Bukit Permai in the Klang Valley recently.

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