

Food for Thought

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SOLVING FLOOD USING NATURE'S WAY

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Flood issues has been haunting Malaysians for many years. The occurrence of flood becomes more and more virulent. We live in equilibrium with nature, that's Association of Water and Energy Research Malaysia's (AWER) stand. Disturb that equilibrium and we will have to face the consequences. Which again proves Newton's third law (universal law), every action has an equal and opposite reaction. It has been reported that the cabinet will look into getting a comprehensive solution to solve flood issues in Malaysia, perhaps some points that we can share.

Flood occurs naturally in many parts of the world as it is part and parcel of water cycle. More so for Malaysia that is blessed with rain due to our equatorial climate. "Rain" is the first keyword. When rain falls, some portion of it is absorbed by the forest and soil. This forms groundwater regime. The balance of the rainfall will be flow on the surface as surface runoff. As we reduce the amount of absorption capacity, naturally we will increase the amount of surface water runoff. Why absorption capacity reduces? It reduces due to deforestation, change of land use, increase in impermeable (surface that does not absorb water) surface and basically development to cater increasing population.

Flash Flood

Flash flood recedes faster than normal flood. We always hear about how rubbish that chokes the drainage and causes flash flood. However, this has its limitations. Flash flood occurrence cannot be solely blamed on the rubbish alone. Although clogged drainage is one of the reasons for flash flood but rivers and monsoon drains (huge concrete drains) that overflows has nothing to do with rubbish. It is more related to design and

maintenance that is not satisfactory.

Design of drainage is not static. It has to be improved with time. We also acknowledge availability of old drainage designs and not upgraded. With the increase in impermeable surface caused by housing development, business areas and roads, a lot of rain water will flow as surface runoff. If the drainage system is inadequate, flash flood will be a normal occurrence.

Normal Flood

The current flood affected areas are facing the normal flood which recedes slower. This causes more problems to affected areas as economic and daily activities are basically stalled. Flowing water fills space, especially when it reaches a dead end or a flat surface. Lakes and fresh water swamps are a good example how nature contained this flood water. Many of this nature's designs are either flattened for development or getting shallower due to higher deposit of sediments. This is definitely not good news in reducing flood occurrence.

Do Deepening and Widening River helps?

Deepening a river means that the volume of water carried at a specific time is increased. However, the deepening of river or drainage must be uniform. If it is only deepened in the affected areas, the areas that brings this water out of the affected areas will be shallower. This might make worsen the condition of flood with settling of sediments and perhaps a worst flood might reoccur.

There should be a uniform deepening and widening of river throughout to drain water faster and away from affected areas.

Are the designs used flawed?

The calculation method for drainage design has to be flexible. In engineering, every design is prepared to function at a worst case scenario and multiplied with safety factor. This means that, the design we have for the flood mitigation plan should be functioning to cater more than the worst case scenario. However, if the critical condition increases rapidly it can cause design failure and more frequent flood occurrence. "Design" is the second keyword.

Therefore, in design process, the rate of increase in critical condition must be taken into consideration. How do we actually measure failure of a flood mitigation design? If flood occurs frequently within short period of time after the implementation of the mitigation project, the mitigation project has failed.

How to solve flood in short term and mid-term planning?

The answer is simple. Every solution that is planned must "mimic" the nature's method around us. Water flows from higher to lower elevation via logical passage (due to gravity). It forms fresh water swamps and lakes in its journey. Similarly, it needs to maintain a good infiltration of water to the soil to maintain the level of groundwater. This is the principle of natural water flow. "Mimic" is the third keyword.

Therefore, flood mitigation projects must be based on these principles. If such a principle is failed to be implemented, not only we will fail to solve the flood problem, we might worsen it. Retention ponds that are created must be maintained periodically. The groundwater level also affects the function of such retention ponds and other methods. Study carefully before deploying any method.

Some of the methods applicable are:

- (i) Hollow tubes – holes vertically into the soil with hollow stones. The stones will absorb the water during rainfall and slowly release it to groundwater.
- (ii) Recreational areas which have wavy surface covered with grass (swale) – it's a temporary rainwater retention area and very suitable in housing estates.
- (iii) Hollow pipes – a piping system which is horizontal similar to hollow tubes. But, it's horizontal and planted in soil. It flows to a collection tank that allows rainwater to slowly seep into soil.
- (iv) Manmade lake – a normal method used in Malaysia. These lakes are placed to retain rain water and release them in a rate that is predetermined. It can also be used as recreational areas.
- (v) Manmade fresh water swamps – swamps contain more water compared to lakes. In swamp areas, variety of plants that can improve the water quality. Putrajaya uses this method to manage surface water flow.
- (vi) Engineering methods – these methods are usually very expensive and will function better with the other support methods as above.

So, with the examples from above, it is evident that delaying surface water flow is an important part of the solution. It's not wrong if we mimic the nature. The result that we want to achieve is the fourth keyword, "delay". Solving flood occurrence is delaying surface runoff flow entering the flood prone areas. Similarly, solutions to drain water in large quantities and faster away from these flood prone areas are also vital.

Preservation and Maintenance is Vital

"Preserve" is the fifth keyword. Prevention is better than curing, and forest covers must be preserved. Deforestation and logging must be controlled. The nature of our landscape for Peninsular Malaysia, Sabah and Sarawak allow a good gravity flow of water. When forest covers are lost at a fast rate, rainwater from the elevated zones will rush down quickly as the delay mechanism is removed. When we lose our forest, we lose a natural flood retention system.

The final keyword is "maintain". Our maintenance culture is not to be proud of. We can deploy best techniques and when we fail to maintain the system we put in place, we are actually placing a 'time bomb'. There should be scheduled maintenance and continuous inspection.

In addition to that, local communities that rely on such flood mitigation projects must be given very basic understanding of how the system works. This will allow quick action when there is failure in the system.

It must also be noted that, Department of Irrigation and Drainage (DID) does not have enforcement power on the above solutions. When solutions are proposed, it is still up to the local government under the state government to implement recommendations. This is an important

issue the needs to be solved. Most of the time, the recommendations given but local government does not impose it.

We hope that Ministry of Natural Resources and Environment as well as DID will put up a long term flood mitigation framework with the involvement of local governments. If need arises, enforcement powers must be given to DID to ensure flood mitigation projects allocations are not wasted due to failure of enforcement.

Remember, every action has an equal and opposite reaction.

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Comments (1 Posted)

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Saya sokong