



DROUGHT MGT STRATEGIES - JMG PERSPECTIVE

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Introduction

- “Review of The National Water Resources Study (NWRS) 2000-2050 and Formulation of National Water Resources Policy" for Economic Planning Unit (EPU) which was completed in August 2011 has recommended an assessment of groundwater resources to be implemented nationwide for the 26 river basins.
- The assessment would provide a database of groundwater resource so that groundwater can be developed quickly and systematically in the event of water shortage as a result of drought season.

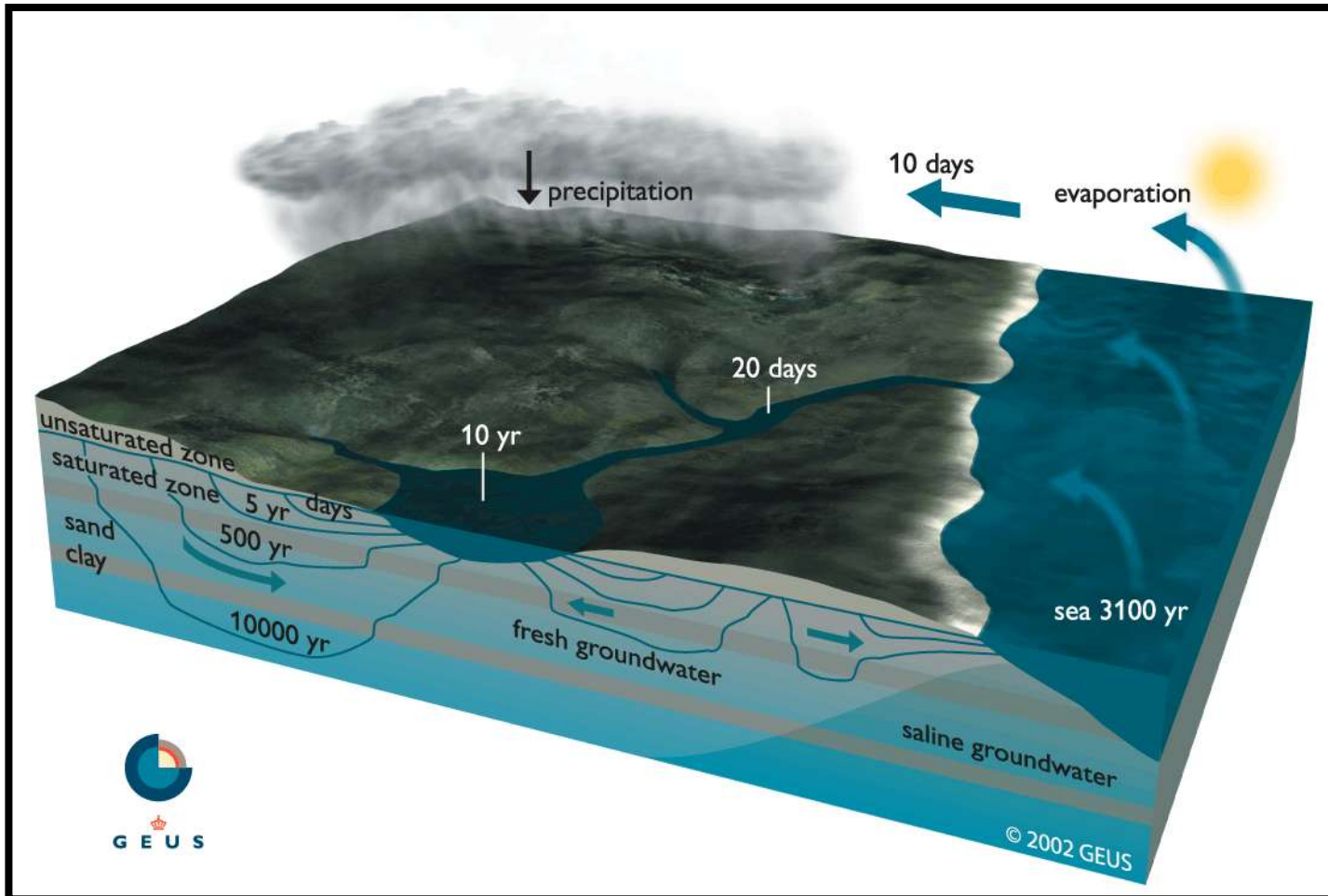
- As more than 98 % of raw water for public water supply in Malaysia is derived from surface water sources, public water supply will be very vulnerable and "rationing" had to be enforced as experienced during March to April 2014 in the State of Selangor and the Federal Territories of Kuala Lumpur and Putrajaya.
- Similar conditions have been experienced in the past in Melaka and Selangor particularly in 1998 and 2008.
- These conditions cause distress to people, disrupt the running of normal life and curtail some economic activities.

ADV & DISADV OF GW

Advantages of gw as a supplementary and conjunctive use include:

- reliable sources (less impact by dry season/climate change)
- naturally protected and has large volume untapped
- it can be developed at source thus cost should be low
- naturally it needs less treatment and has less env. damage
- gw has high mineral and nutrient that is good to human as well as for agriculture sector.

Water flows in terms of years

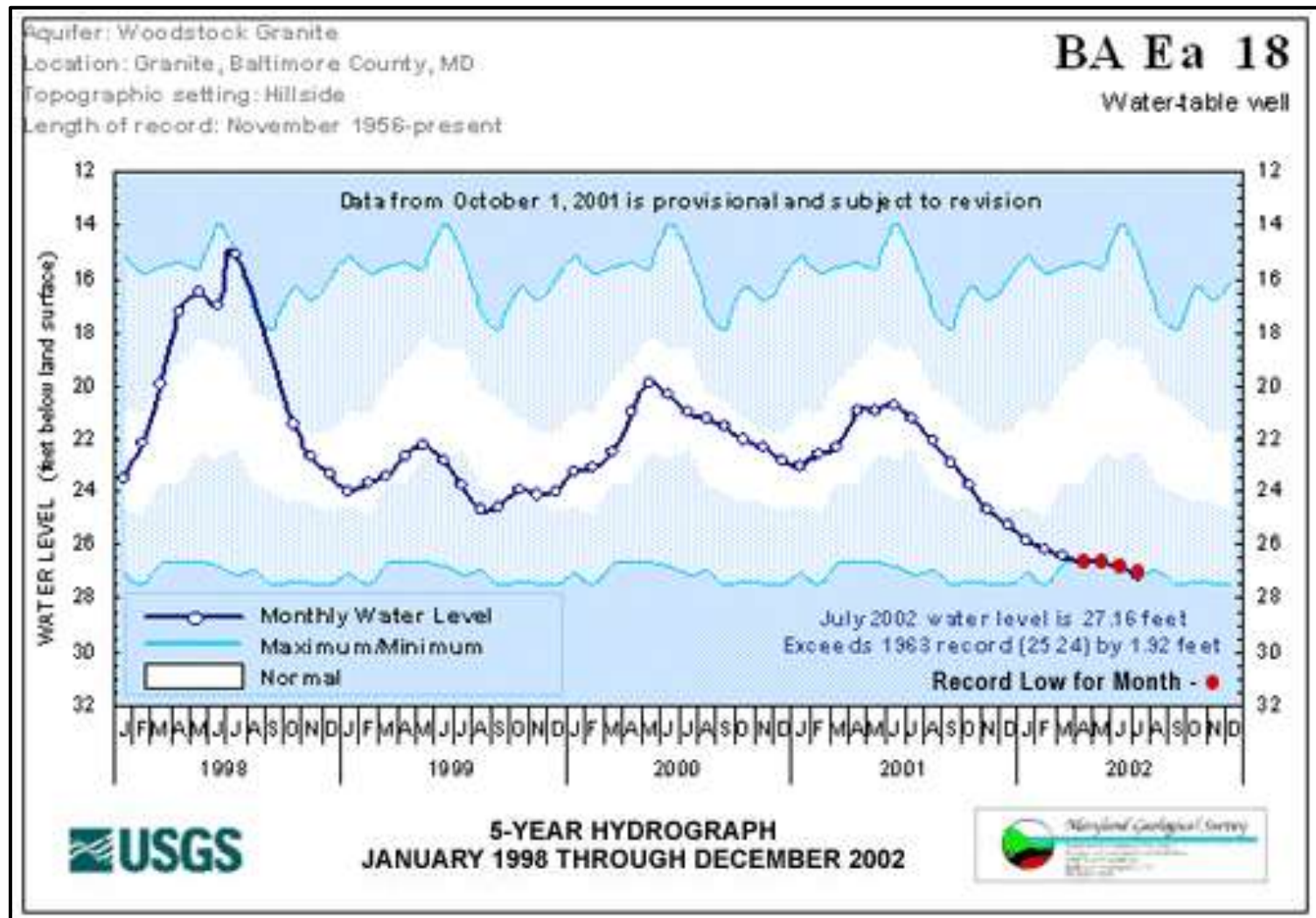


ADV & DISADV OF GW (cont)

Disadvantages of gw include:

- invisible resource and hence prone to misconception by many including NGO's, water related business people and policy makers
- uncertainty of gw reserve is due to insufficient fund to study the matter in more detail
- only small coverage area has been studied (50% alluvial aquifer and 10% hard rock aquifer). So the real potential of groundwater in Malaysia has not been realised

Drought water level for gw



Drought Management Strategies

- **Well, Yield and Quality Inventory of Groundwater**

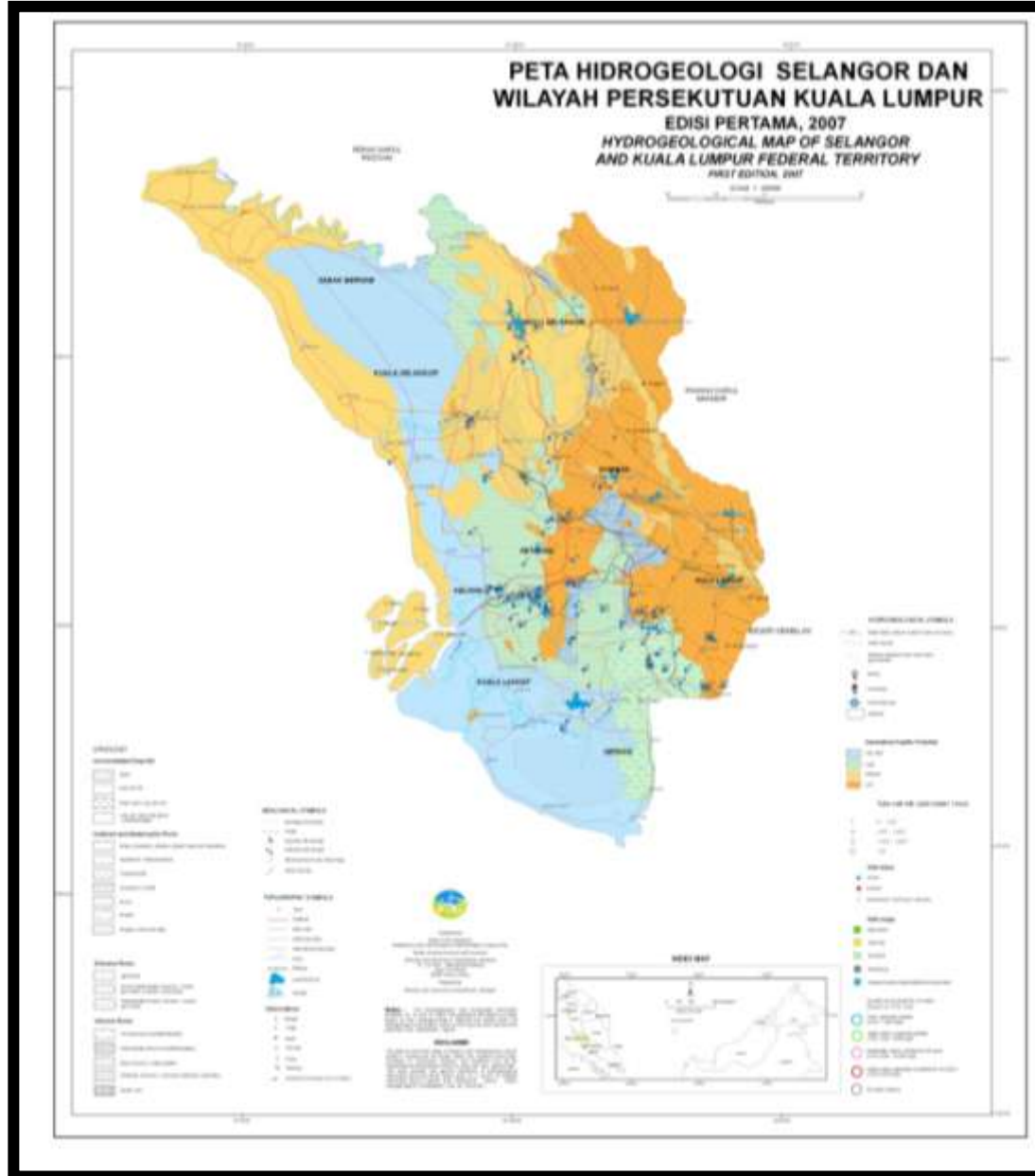
In every states, JMG has been equipped with complete and up to date inventory of gw wells for use during Drought Period.

- **Groundwater Monitoring**

The purpose of monitoring groundwater is to evaluate the quantity, quality, the extent of contaminated groundwater and possible occurrence of land subsidence. This monitoring activity is also being used to established groundwater protection zone in order to avoid contamination and sterilization of aquifers and to develop groundwater in an efficient and sustainable manner.

Monitoring of groundwater level, groundwater quality and measurement of land subsidence are done in all states. Monitoring network are established as to cover all groundwater areas especially to those areas that are drought prone, those actively being used and those that partially being abstracted. From these observations, JMG will produce yearly regional monitoring reports and 5 yearly monitoring trend reports for further actions. From these reports, high risks areas are identified and appropriate plans are being taken.

Gw potential map of Selangor and WP



Production well at Kelantan



Gw production well system for villages at Bt Kepong, Muar, Johor



Gw sampling of monitoring well



On site physical and chemical testing of gw



Gw being used at island resort in Terengganu



- **Groundwater For Peat Fire Fighting**

Drought is not only having not enough water for consumption to human but also to other life forms. It is also causing haze from fire breakout especially at dry peat areas in Selangor, Johor, Pahang, Terengganu, Kelantan, Sarawak and Sabah.

A solution has been put forward by the Department to reduce haze problem using groundwater by wetting the dry peat ground. Groundwater from the underlying aquifers can be pumped to the open drains, container or it can flood the surrounding peat areas by increasing the water table, thus minimising burning peat and haze problems.

Gw well being pumped to the drain to increase the water table of the dry peat ground



For Short Term Programme:

Groundwater exploration and development

- Exploration and development of domestic water supply at critical water stress areas in Selangor, Negeri Sembilan, Melaka, Kedah and Johor.
- To supply groundwater to water supply operators near their elevated tanks which can be used directly with some treatment especially during drought seasons.
- Groundwater can be developed immediately for peat fire fighting in Selangor Johor, Pahang, Terengganu, Kelantan, Sarawak and Sabah.

Drilling of deep gw well



For Long Term Programme:

Nationwide assessment of groundwater potential in hard rock and alluvial aquifers

- Systematic hydrogeological assessment and zoning of potential gw areas for hard rock aquifers using geological parameters, GIS and remote sensing techniques . Drilling will be done to get discharge potentials of the wells and subsequently groundwater storage of the zones will be estimated. Target areas by 2020 are basins in water stress areas (Selangor, Negeri Sembilan, Melaka, Kedah and Johor).
- Systematic hydrogeological assessment on alluvial aquifers including groundwater modelling will be done to estimate groundwater storage. Target areas by 2020 are major river basins of Kelantan, Selangor, Pahang, Perak, Kedah and Terengganu.

For Long Term Programme (cont)

Database Development and Updating

- Integrated database of groundwater among agencies can be centralized in JMG. The database should be reliable and a standard format data to be used for easy transfer and updating. This shared database can be used by members for research and as a management tool.

Groundwater Management and Legal Framework

- Implementation of the new act (Geological Survey and Geoscience Act, 2015?) will cover a lot of new grounds for groundwater especially on the permission to drill, to start abstraction and closure of the wells.
- There is a need for the state authorities for licensing and effective enforcement in order to really manage groundwater resources sustainably.

For Long Term Programme (cont)

- Monitoring of groundwater by related agencies (JMG and JAS) should be continued (after some review of the present systems). This will protect the groundwater aquifers and it will also gives early warning to those aquifers that are about to be polluted or contaminated.
- It is timely that Independent Groundwater Producer (IGP) similar to IPP of the power producers to be encouraged. This will be beneficial to the community as well as to the business sectors.
- There is a need to look into rehalibitation and mitigation measures of already polluted groundwater.

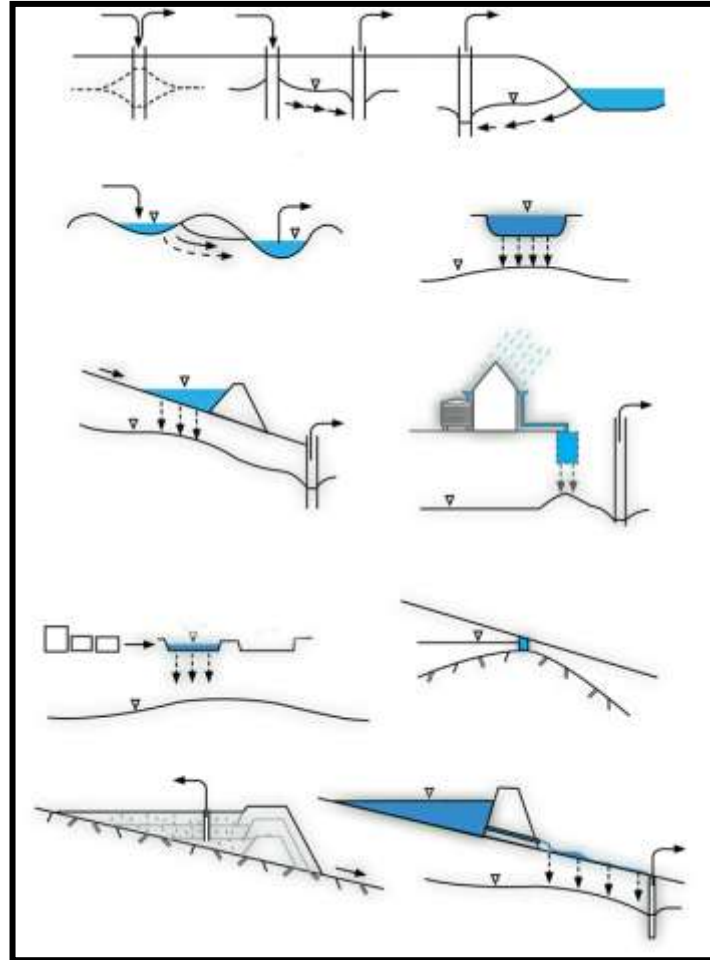
Research and Development (R & D)

- There is a need to strengthen R&D on groundwater activities such as Managed Aquifer Recharge (MAR) and impacts of climate change to groundwater resource. These research will undoubtedly help to optimise groundwater abstraction and utilisation.

Managed Aquifer Recharge

Building infrastructure and/or modifying the landscape to intentionally enhance GWR

Recharge enhancement provides additional storage



Research commenced 1992: Suburban stormwater ASR (Andrews Farm subdivision)



Conclusions

- JMG has dealt with groundwater investigation and development for the last 50 years in Malaysia. As the drought occurrence is becoming quite common nowadays, groundwater resources, as part of the water cycle, need to be managed properly. Drought management strategies are laid out by JMG. Continuous updating inventory of wells, monitoring of groundwater resources throughout the nation is one aspect while groundwater also helps in solving some of the drought related problems such as minimising peat fire to reduce haze problem.
- In general groundwater is a source that needs more attention as it is also a security resource and hence sustainability and proper governance are essential ingredients.
- Short and long term programme are laid out in terms of its exploration and development of nationwide assessment, R&D of the resource and upgrading available database. Management of the resource and legal framework as well as preparation for protection and mitigation of the resource from pollution/contamination are some of the long term groundwater management strategies.

Conclusions (cont.)

- Malaysia still need to increase its manpower capabilities to meet the complex issues related to groundwater particularly with regards to drought. The whole groundwater industry needs some form of local standards in order to be more effective in managing the resource.
- There is also a need for political interjection on the Policy of Groundwater Usage so as to achieve 20% of groundwater supply by 2020 in Malaysia.
- Finally, to avoid misconception and wrong doings, there should be proper dissemination of groundwater knowledge to all categories from policy makers to the young generation including students and NGO's. One may be able to see the advantages of using groundwater to the nations and setback or negative impacts of using groundwater if not used properly and not following the best practices.

