



Water consumption and crop water use in Malaysia

I live in Selangor state, where people here enjoy free water for the first 20 cubic meters. My monthly water bills have been reading negative (yes, *negative*) RM21 because I had continued to pay about RM7 every month for three months, without realizing that when the opposition parties gained control of Selangor, they had proclaimed free water for all Selangor citizens. In other words, I had overpaid my (free) water for three months. Silly me.



Should water really be free? (photo from airuntukrakyat.net)

I have also seen billboards around, setup by the opposition parties, that essentially screamed, “Water should be free because water is our right”.

While I agree that water is our right, I am uncomfortable with the idea that water should thus be free (even if it is free up to 20 cubic meters). The problem when water is given free or heavily subsidized is it makes people wasteful in water use and oblivious to the scarcity and importance of water.

No one would disagree that water is absolutely crucial to life. A person may survive for weeks (and even months) without food. But in extreme conditions such as being locked inside a fully enclosed car parked under the sun can kill a child in

a few hours due to severe dehydration.

Besides, can anything replace water? We can replace our energy from dirty fossil fuels (such as coal, gas, and diesel) with renewable sources such as sun, wind, sea waves, and underground heat (geothermal energy). But what about water? There is no substitute to water.

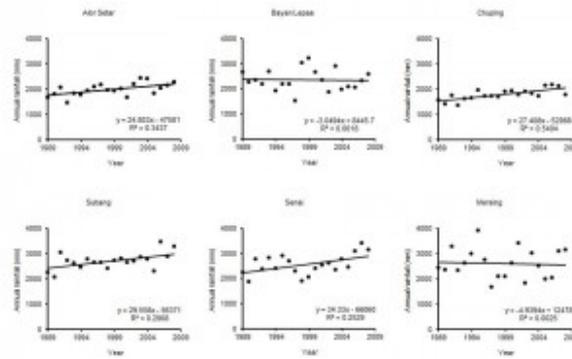
Rains bring water down to the grounds, and the water from the grounds returns to the atmosphere via evaporation, which, in turn, form clouds and subsequently rain. This completes the [Earth's hydrological cycle](#).

Consequently, the amount of water on Earth has remained the same. The water we drink today is the same water that has been drunk by animals, dinosaurs, plants, and other humans in the past. The amount of water we have now has to be shared with our future generations. There is no additional water supply to meet the increased water demand by the people of the future.

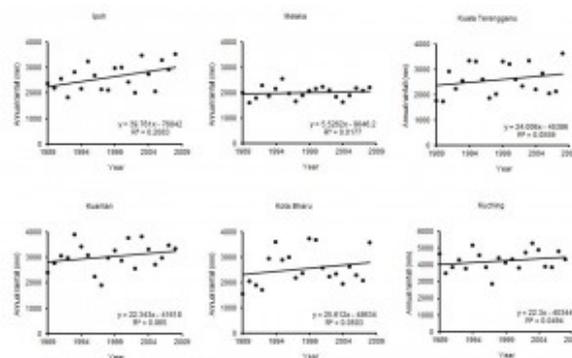
The Earth may be covered by over 70% water, but only 2% of that water is freshwater that we can consume directly. Furthermore, not all of that 2% freshwater can be used. Slightly over 30% of the Earth's freshwater come from groundwater sources, rivers, and lakes. The rest is from ice caps and glaciers. This means the freshwater which we can easily obtain and consume only comes from 0.6% of Earth's total water.

Malaysia may be blessed with abundant rains, averaging between 2,000 to 3,000 mm annual rainfall. However, not all rains fall in water catchment areas and the rainfall distribution is not uniform throughout the year. There would be periods of dry weather. States like Penang, Selangor, Melaka, and Perlis often suffer from periods of low water supply.

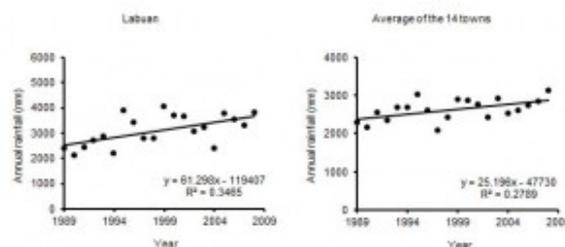
I obtained the rainfall data from 1998 to 2008 for 14 towns in Malaysia. Some towns such as Alor Setar, Chuping, Subang, and Senai see a rather clear trend of increased rainfall per year. In contrast, towns such as Mersing, Kuantan, and Kota Bharu see no trend of rainfall change per year. Nonetheless, averaged across all of the 14 towns shows that, on average, Malaysia sees an increase in rainfall by about 26 mm per year.



Annual rainfall for some towns in Malaysia (1989-2008) - Set 01



Annual rainfall for some towns in Malaysia (1989-2008) - Set 02

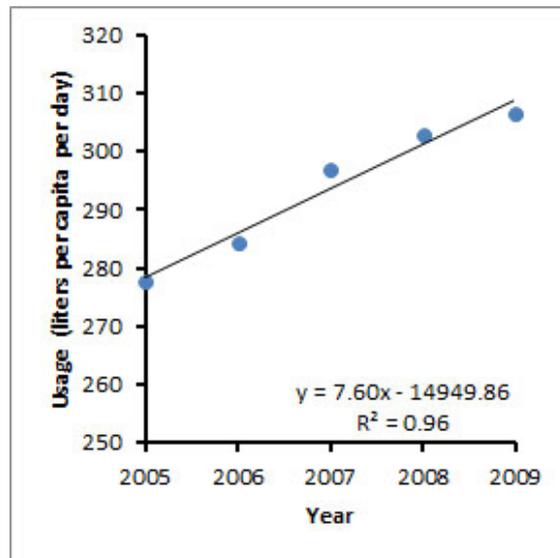


Annual rainfall for some towns in Malaysia (1989-2008) - Set 03

So, Malaysia sees an overall increased rainfall per year, but does this mean Malaysia has little to worry about water supply meeting water demands?

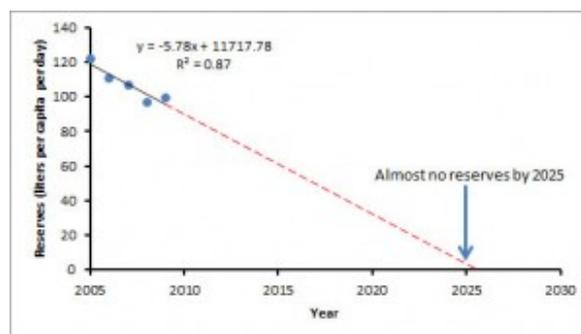
Let's see. Malaysia's water consumption is alarmingly high and increasing every year. In 2009, Malaysians consumed more than 300 liters of water per person per day compared to 150 liters per person per day by Singaporeans. Furthermore, Malaysians' water consumption per capita per day increases about 7.6 liters per

year.



Malaysia's increasing water consumption (2005-2009)

Worryingly, this increase in water consumption is not matched by an increase in water reserves. Since 2005, Malaysia's water reserves per capita per day is declining at a rate of 5.8 liters per year. At this rate, Malaysia would be left with nearly no water reserves by 2025.



Malaysia's declining water reserves (2005-2009). By 2025, Malaysia could have little reserves left.

Malaysia obtains freshwater nearly all (97%) from surface water sources such as rivers and the rest (3%) from underground sources. The bleak news is the number of rivers in Malaysia classified as "Clean" has declined by 12.5% from 80 rivers in 2005 to 70 in 2009.

Bottled water is a rapidly growing and lucrative industry. Global bottled water consumption increases about 7% per year, and Asia makes up 26% of the world's bottled water consumption. Probably because Malaysia has not fully tapped the underground water sources, bottled water consumption in Malaysia is relatively low compared to neighboring countries. Thailand consumed about 77 liters of bottled water per capita in 2004, followed by Brunei (53 liters), Indonesia (31 liters), and Singapore (24 liters). The Philippines, Malaysia, and Vietnam each consumed less than 24 liters per capita in 2004.

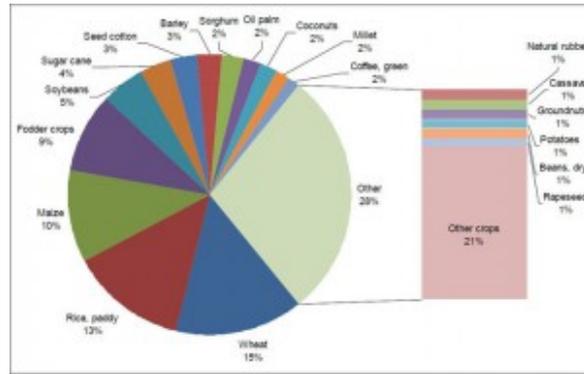
Unfortunately, bottled water depletes groundwater sources. For instance, two liters of groundwater is required to produce one liter of bottled water. This net loss means if the consumption of bottled water keeps increasing, the extraction of underground water would become unsustainable, extracting more water than what can be replenished from rivers and rain.

Bottled water consumption is increasing in Malaysia for several reasons:

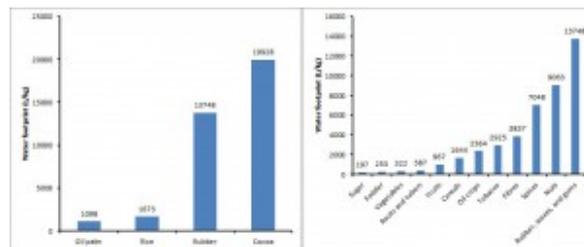
1. Convenience of clean water being available when needed
2. Dissatisfaction over municipal water
3. Increased perception and demand for clean, odourless, and colourless water

Compared to all other industries, the agriculture sector consumes the most water. Eighty five percent of the world's water consumption is by the agriculture sector at a rate of 235 million liters per second! And 70% of that water is wasted.

World crop production in the period 1996 to 2005 consumed an average of 7,404 trillion liters per year, of which the three main cereal crops, wheat, rice, and maize, consumed nearly 40% of that water amount. Huge and incredible amounts of water are needed to produce agriculture products. Between 1,000 to 2,000 liters of water is needed to produce 1 kg of rice and oil palm. This range is dwarfed by the production of 1 kg of cocoa and rubber, where they require about 13,000 and 20,000 liters of water, respectively.

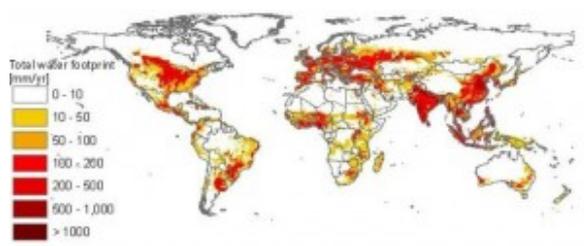


Proportion of water footprint for global crop production. World crop production in the period 1996 to 2005 consumed an average of 7,404 trillion liters per year. Figure from Mekonnen and Hoekstra (2010).



Water consumption for some crops (left) and primary crop groups (right)

For Malaysia, the total water consumption for crop production is 54 trillion liters per year which translates to 1.7 million liters of water per second is used for crop production. Total land area used for crop production in Malaysia is about 6.6 million hectares. So, this works out to 820 mm of water per year, or approximately 30 to 40% of Malaysia’s annual rainfall, is used for crop production.



Water footprint for crop production around the world. Figure from

Mekonnen and Hoekstra (2010).

In Malaysia, oil palm only uses about 550 liters of water for every 1 kg of crop yield. Rice production in Malaysia consumes nearly 3,000 liters of water for every 1 kg crop yield. Coffee, cocoa, and rubber are among the highest consumers of water, using between 10,000 to 20,000 liters of water for every 1 kg of crop yield.

Table 1: Crop water use (L/kg) in Malaysia

Crop	L water / kg yield
pumpkins, squash and gourds	75
cucumbers and gherkins	107
cabbages	114
sugar cane	141
watermelons	223
tomatoes	238
vegetables	262
pineapples	268
sweet potatoes	296
roots and tubers	442
cassava	541
oil palm	551
banana	629
papayas	837
ground nuts	886
fruit, fresh	1,188
oranges	1,224
grape fruit and pomelo	1,242
citrus fruits	1,297
maize	1,408

Crop	L water / kg yield
lemons and limes	1,476
fruit, tropical	1,541
ginger	1,603
pepper	1,901
mangoes	2,442
coconut	2,822
rice	2,946
oil seeds	3,191
tobacco	3,361
cashew nuts	4,608
tea	6,351
betel nuts	6,456
pimento and all spice	10,167
cocoa	11,418
coffee	12,741
rubber	19,146
nutmeg, mace and cardamoms	25,000
cloves	43,000
TOTAL (all crops)	917

All these figures and calculations show that Malaysia may receive large amounts of rain, but large amounts of water are used for agricultural purposes. Water is also used in large quantities by other industries in downstream activities. For example, oil palm may require a global average of 1,000 liters for every 1 kg of oil palm yield. However, to produce 1 kg of palm oil products requires an additional 4,000 liters of water to extract and process the oil from the oil palm bunches.

This situation is not helped when Malaysians are generally negligent users of

water, consuming, as stated earlier, more than 300 liters per person per day, nearly double the figure of 165 liters as recommended by the United Nations.

And if water continues to be heavily subsidized or be offered free, I do not expect water consumption among Malaysians to be reduced significantly anytime soon. As [Prof. Chan Ngai Weng](#) of [Universiti Sains Malaysia](#) remarked, “If Malaysians can reduce their water consumption by 10 to 20 percent, then the country does not need to build a dam at least for the next 10 years.”

References

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5. [Volume 1](#) and [Volume 2](#) - Mekonnen, M.M. and Hoekstra, A.Y. (2010) The green, blue and grey water footprint of crops and derived crop products, Value of Water Research Report Series No.47, UNESCO-IHE, The Netherlands.