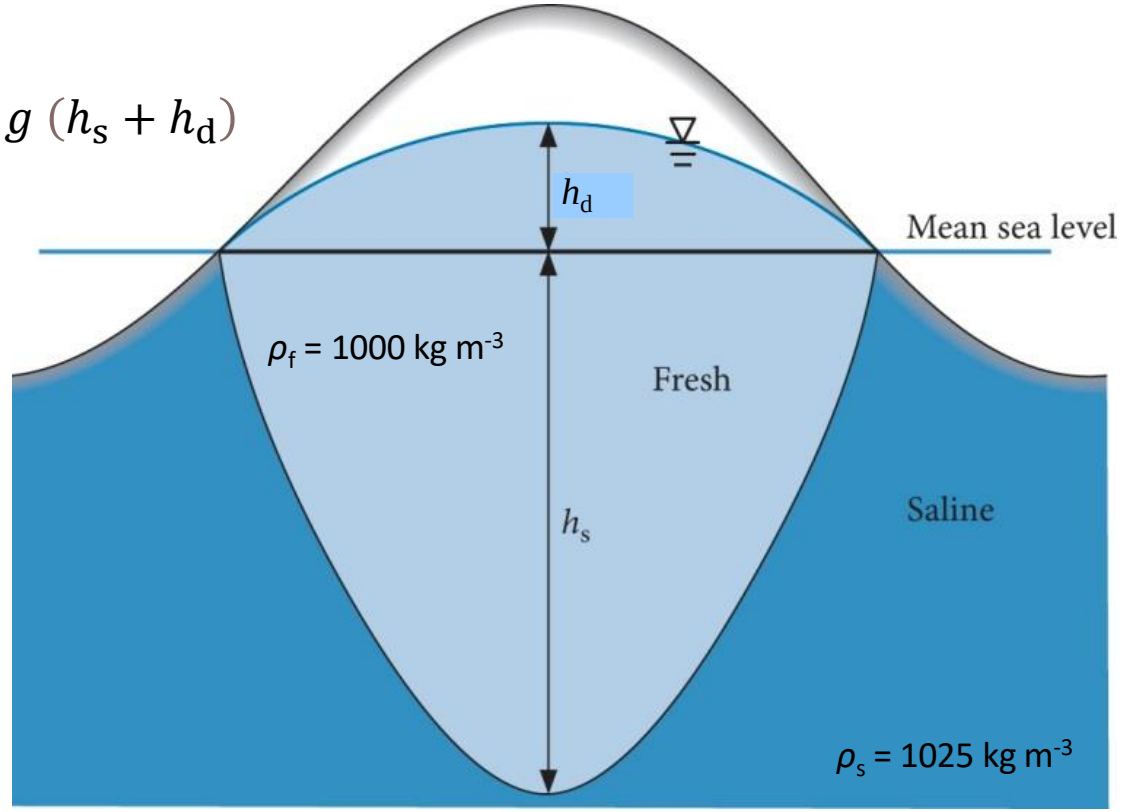
Fresh and saline: Ghijben-Herzberg

https://www.youtube.com/user/MartinRHendriks/videos

h_d = convexity = differential head

$$h_f = h_s + h_d = \frac{p}{p_f\, g} \quad \Rightarrow \quad p = \rho_f\, g\, (h_s + h_d)$$

$$h_s = \frac{p}{p_s\, g} \quad \Rightarrow \quad p = \rho_s\, g\, h_s$$

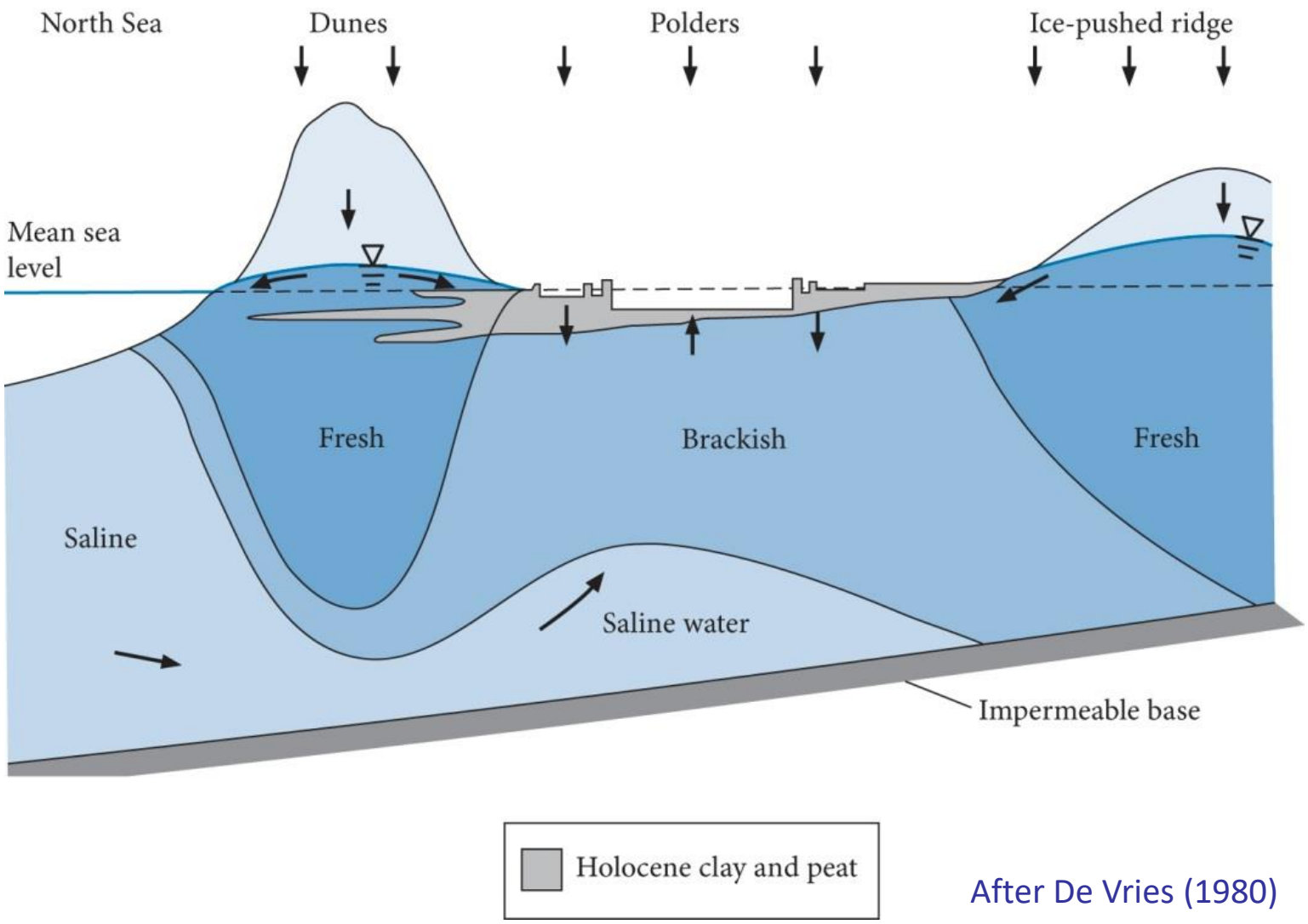


$$h_s = \frac{\rho_f}{\rho_s - \rho_f} h_d \qquad h_s \approx 40\, h_d \quad \Rightarrow \quad h_s + h_d \approx 41 h_d$$

Coastal dunes of the Netherlands: $h_s + h_d$ is 15 to 25 times h_d (Bakker 1981)

Holland

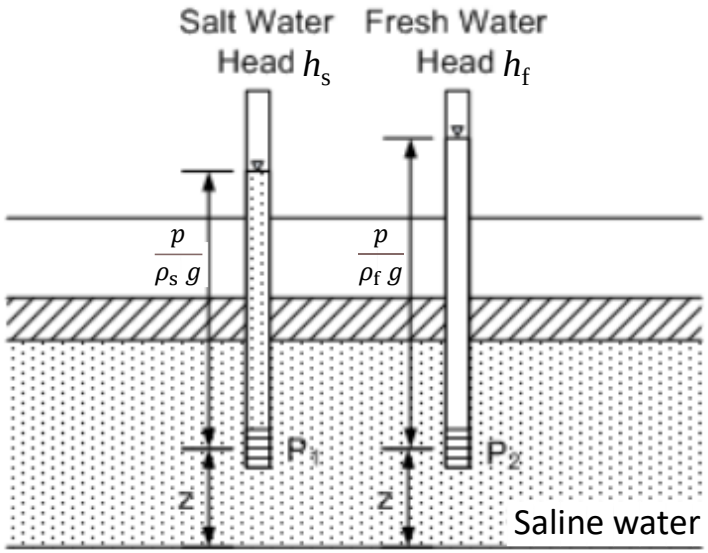
https://www.youtube.com/user/MartinRHendriks/videos



After De Vries (1980)

Equivalent fresh water head

https://www.youtube.com/user/MartinRHendriks/videos



$$h_s = z + \frac{p}{\rho_s g} \Rightarrow \frac{p}{g} = \rho_s (h_s - z)$$

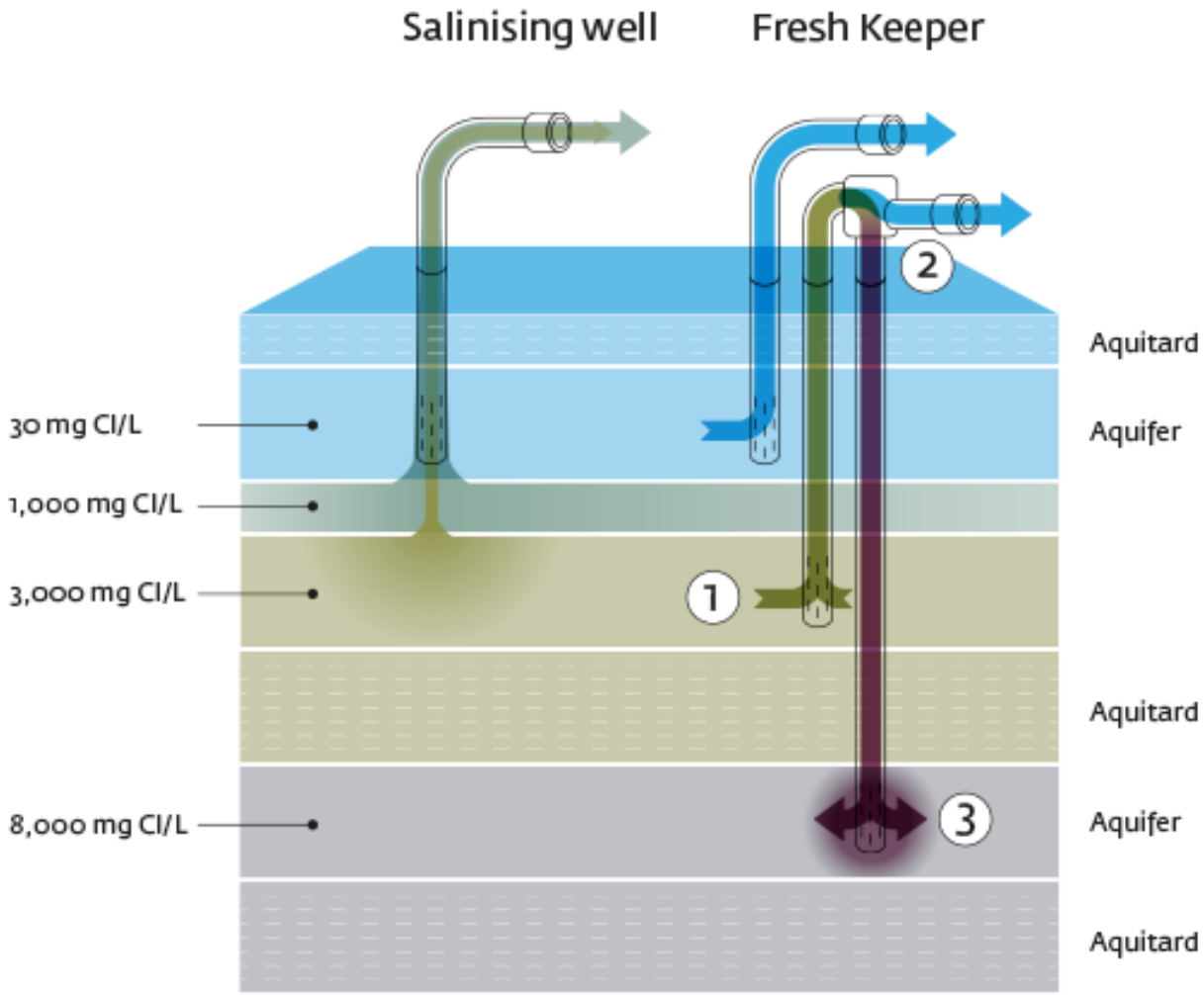
$$h_f = z + \frac{p}{\rho_f g} \Rightarrow \frac{p}{g} = \rho_f (h_f - z)$$

$$h_f = \frac{\rho_s}{\rho_f} h_s - \frac{\rho_s - \rho_f}{\rho_f} z$$

$$(h_f = \frac{41}{40} h_s - \frac{1}{40} z)$$

Freshkeeper concept

https://www.youtube.com/user/MartinRHendriks/videos



Source: Watershare

References

https://www.youtube.com/user/MartinRHendriks/videos

Bakker, T.W.M. (1981). Nederlandse kustduinen. Geohydrologie. PhD thesis Landbouwhogeschool Wageningen. Pudoc, Wageningen.

De Vries, J.J. (1980). Inleiding tot de Hydrologie van Nederland [Introduction to the hydrology of The Netherlands]. Rodopi, Amsterdam.

Hendriks, M.R. (2010). Introduction to Physical Hydrology. Oxford University Press.

Watershare. Freshkeeper: https://www.watershare.eu/projects/freshkeeper/