

Example 2.3 Reservoir Evaporation

Table 2.5 indicates that the average June pan evaporation at Folsom Reservoir on the American River in California is 10.13 inches. Folsom Reservoir has a storage capacity of 1,140 million m^3 . At capacity, the water surface has an area of 4,610 ha.

- Estimate the average June evaporation volume that would occur with a full reservoir. Use a pan coefficient of 0.7. Express the evaporation volume alternatively in units of m^3 and ac-ft.
- Assuming a per capita domestic water use rate of 80 gal/day, the June evaporation loss from Folsom Reservoir is equivalent to supplying domestic water for how many people?
- Assuming a June irrigation demand of 30 cm of water, the evaporation loss is equivalent to irrigating how many square miles of crop land?

Solution

$$\begin{aligned}\text{Evaporation volume} &= (0.7)(10.13 \text{ in})(4,610 \text{ ha})\left(10,000 \frac{m^2}{ha}\right)\left(0.0254 \frac{m}{in}\right) \\ &= 8,303,000 m^3\end{aligned}$$

$$\text{Evaporation volume} = (8,303,000 m^3)\left(0.0008104 \frac{ac-ft}{m^3}\right) = 6,730 \text{ ac-ft}$$

$$\text{Number of people} = \frac{8,303,000 m^3}{\left(\frac{80 \text{ gal}}{\text{day}}\right)\left(\frac{1 \text{ person}}{30 \text{ days}}\right)\left(0.003785 \frac{m^3}{gal}\right)} = 914,000 \text{ people}$$

$$\text{Area of irrigated crop land} = \left(\frac{6,730 \text{ ac-ft}}{(30 \text{ cm})\left(0.03281 \frac{ft}{cm}\right)}\right)\left(\frac{mi^2}{640 \text{ ac}}\right) = 10.7 \text{ mi}^2$$