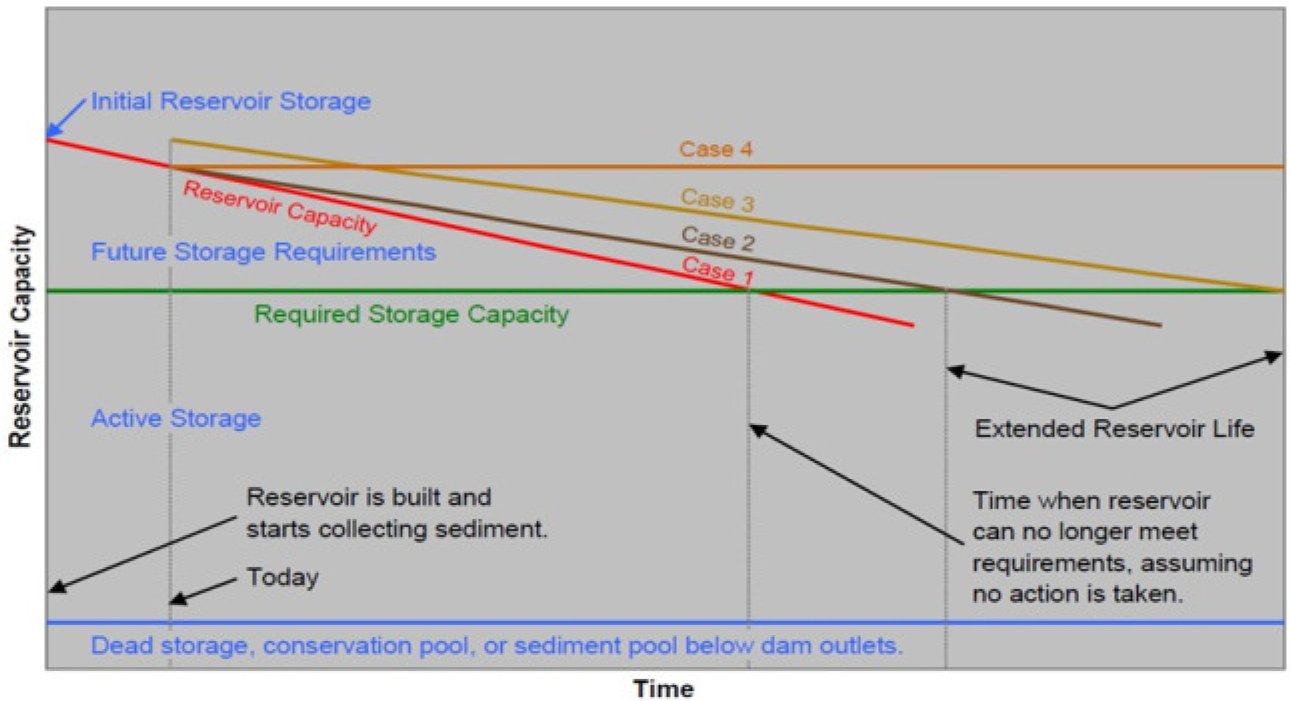
IMPACT OF SEDIMENT MANAGEMENT ON RESERVOIR LIFE

As shown in Figure, the Initial Reservoir Storage is the sum of Future Storage Requirements, Active Storage, and Dead Storage. The line designated as Today is the point at which sediment mitigation is implemented.



The Reservoir Capacity line indicates the steady decline of the reservoir's storage capacity as sediment accumulates over time. This storage loss begins the moment water is stored. The rate of capacity decline (slope of the line) depends on local conditions. In reality, the decline of reservoir capacity is an irregular process with the greatest sediment accumulation taking place during annual spring runoff and during rainfall events. Both of these change over the years too. The rate of capacity decline is estimated as a straight line from the time the reservoir is built until today, and projected into the future.

The Required Storage Capacity line indicates the minimum storage necessary for the water system, of which the reservoir is a part, to function. Notice the intersection of the Reservoir Capacity line and the Required Storage Capacity line. This is the time when the reservoir capacity can no longer meet the requirements for which the reservoir was built. This occurs long before the reservoir is completely filled with sediment.

As time passes beyond this point, reservoir uses can become more and more restricted. The restrictions can pass unnoticed due to the normal variations in the water supply and reservoir usage. With sufficient data, this point can be estimated to plan for the future and help determine the urgency for sediment mitigation actions. This typically varies from when 15 to 40 percent of the reservoir storage is lost.

Case 1 – shows the reservoir capacity over time if no action is taken and sediment is allowed to accumulate with no mitigation.

Case 2 – shows the reservoir capacity if one, or more, sediment mitigation strategies are implemented, resulting in a slower rate of sediment accumulation in the reservoir. Notice the resulting extension of the reservoir's useful life.

Case 3 – shows the reservoir capacity after removing a certain volume of sediment from the reservoirand simultaneously enacting one, or more, sediment mitigation strategies that results in slowing the rate of sediment accumulation. Notice the greater extension of the reservoir's useful life than Case 2.

Case 4 – shows the reservoir capacity after enacting one, or more, sediment mitigation strategies that result in stopping sediment accumulation in the reservoir completely. Depending on local conditions, this may or may not be possible. When it is possible, the Reservoir Capacity and Required Storage Capacity lines never intersect and the reservoir's useful life is potentially extended indefinitely. One scenario to achieve this is a combination of bypassing sediment during spring runoff and hydrosuction removal of previously accumulated sediment. Hydrosuction or another single method alone could also accomplish this.

Source: https://civilsolution.wordpress.com/category/civil-engineering/