

River deltas like Ganges Delta Started by Deforestation by early Hominids?



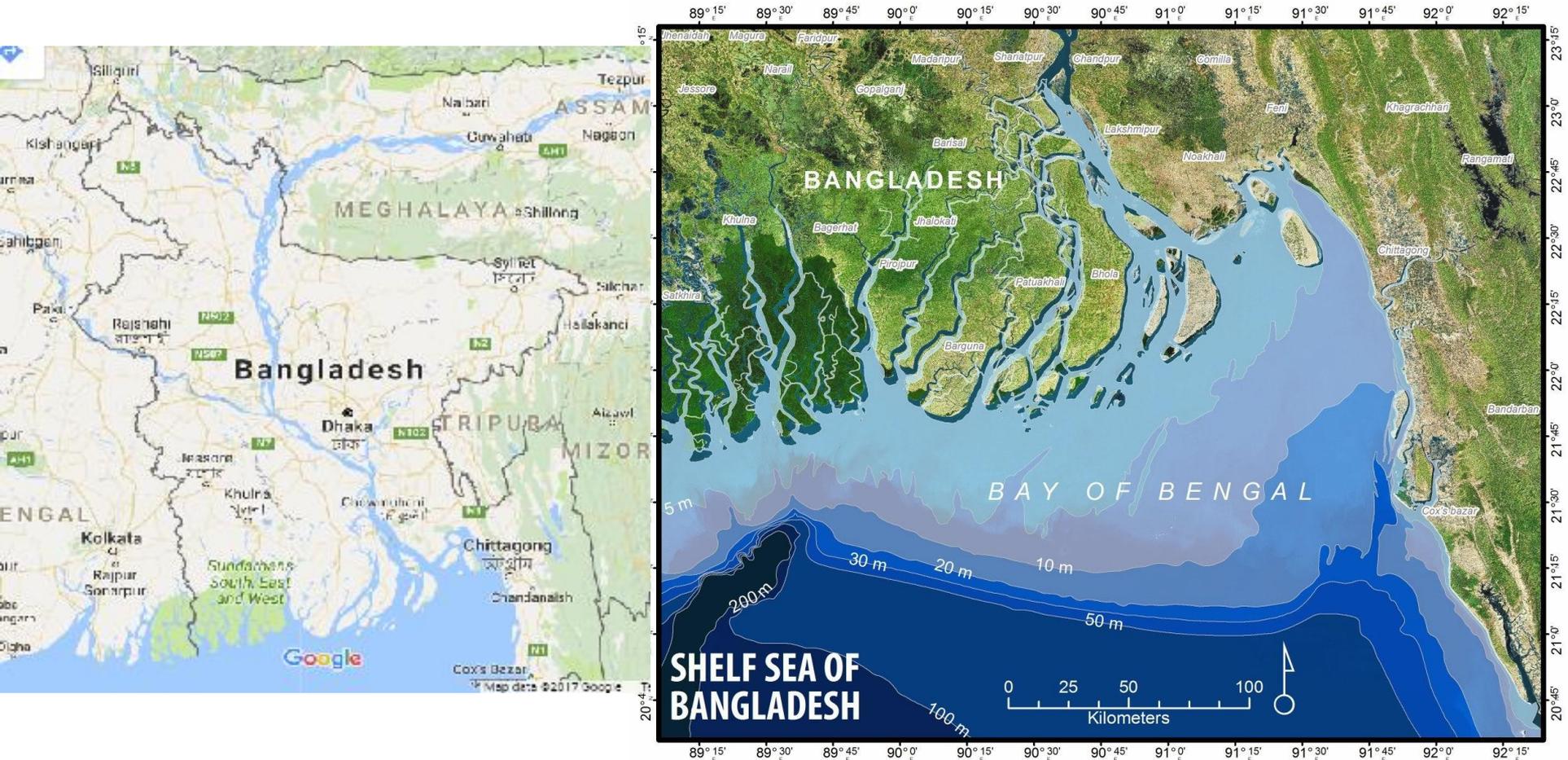
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Outline

- Today's focus is on changing river deltas, such as the Ganges delta, Mississippi delta, etc.
- Nature of river deltas and changes can be better understood from their origins, especially in the light of anthropogenic (man made) causes.
- River deltas like the Ganges delta created by silt carried downriver.
- Age of delta can be calculated from length increase per year or silt carried per year and volume
- River delta creation should have been going on for much longer than above period
- Why the land has been created for only this short time in the much larger frame of geological time of billion years in creation of Pangea and continents.
- Likely explanation is that the Ganges delta (and other river deltas) have been created from anthropogenic or man-made causes.
- Tree-cutting and deforestation by Man must have created the sharply increased silt generation that resulted in creation of the Ganges delta and other river deltas worldwide.
- Hominids (Australopithecus, etc.) millions of years ago arly hominids have only been around for a few million years, of which fire was controlled by them for at least 1.3 million years.
- This will help us to better plan our response to the changing nature of river deltas.

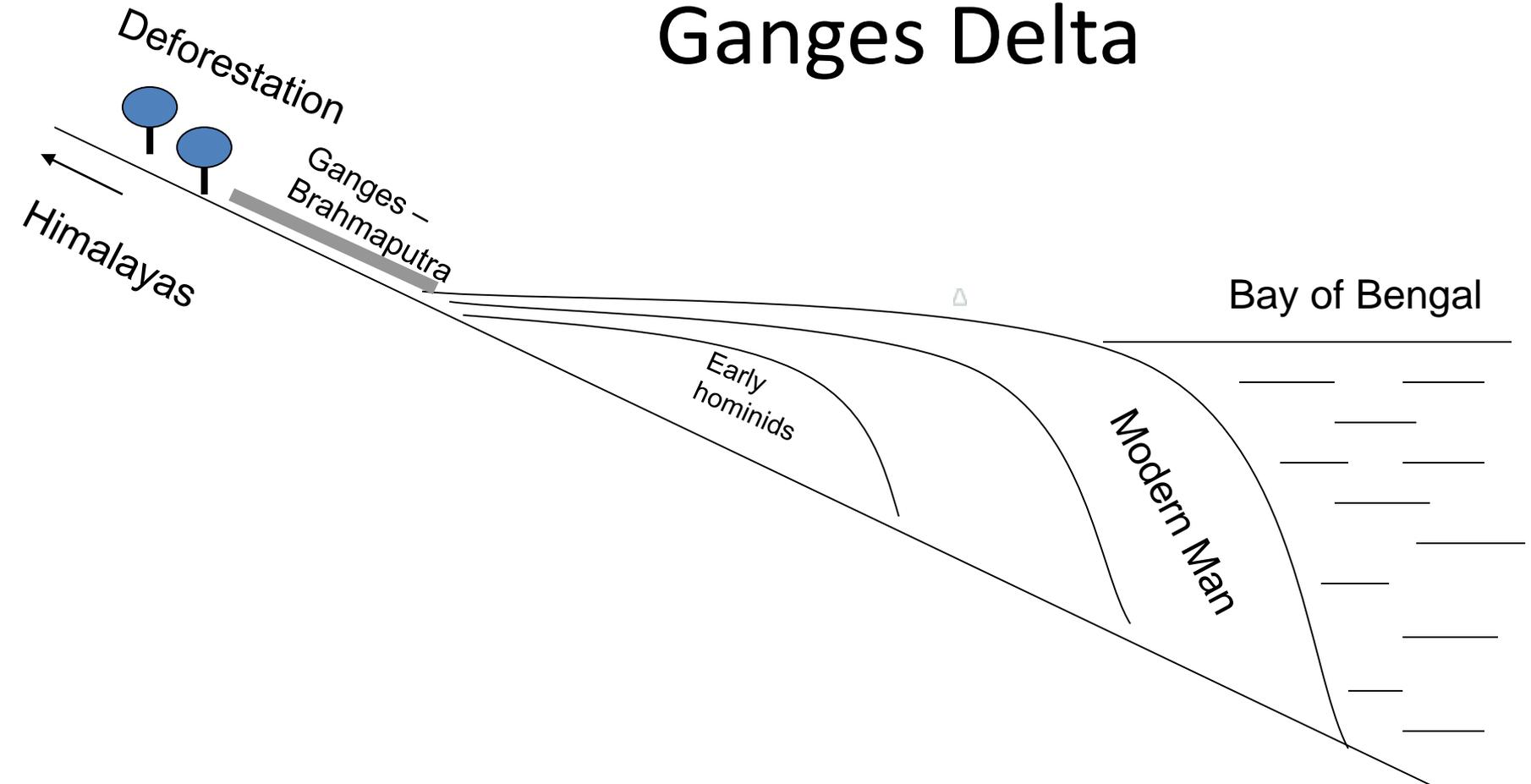
Dimensions and Depth of Delta



Creation from Siltation

- River deltas like the Ganges delta created by silt carried downriver
- What is the age of deita?
- Age can be calculated from both
 - (a) length gain per year and
 - (b) tons of silt carried downriver every year

Deforestation and Creation of Ganges Delta



Age of Delta Based on Length

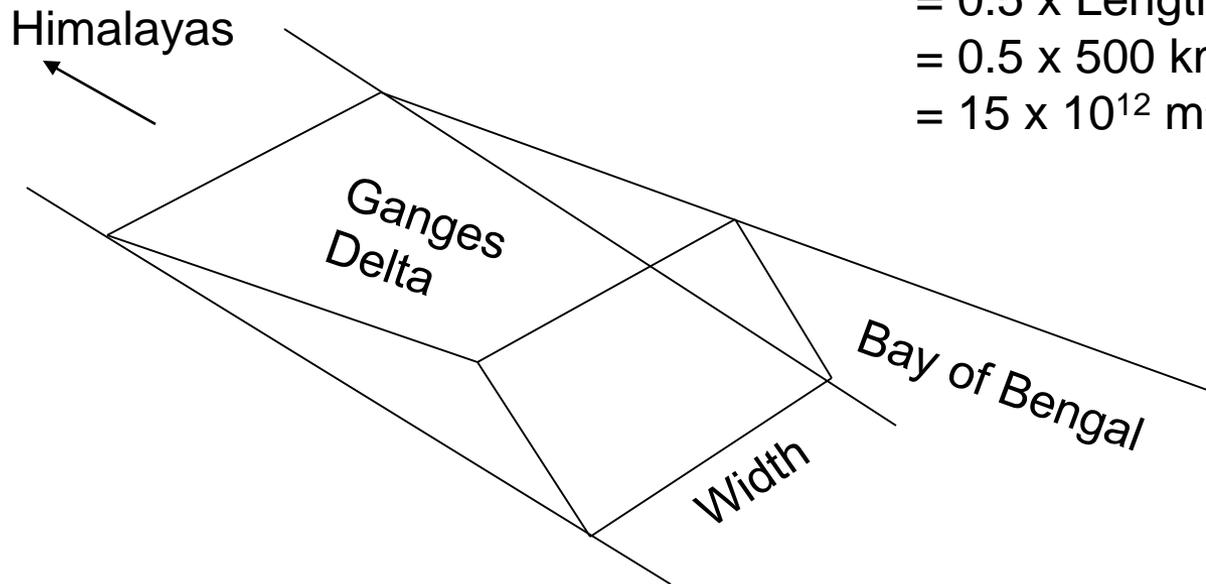


Age of Delta =

$$\frac{\text{Length_of_Delta}}{\text{Length_Gain_per_Year}}$$

$$\frac{400_km}{10_m/year} = 40,000 \text{ years}$$

Age Based on Volume of Delta



$$\begin{aligned}
 \text{Volume} &= \text{Cross section} \times \text{Width} \\
 &= 0.5 \times \text{Length} \times \text{Height} \times \text{Width} \\
 &= 0.5 \times 500 \text{ km} \times 200 \text{ m} \times 300 \text{ km} \\
 &= 15 \times 10^{12} \text{ m}^3
 \end{aligned}$$

$$\text{Age of Delta} = \frac{15 \times 10^{12} \text{ m}^3}{10^9 \times 1000 \text{ kg} / 2700 \text{ kg} / \text{m}^3} = 40,500 \text{ years}$$

Actual Age is Much Greater

- Silt – carried by rivers likely to be much less in previous thousands of years.
- Actual age of delta likely to be much greater at hundreds of thousands or millions of years

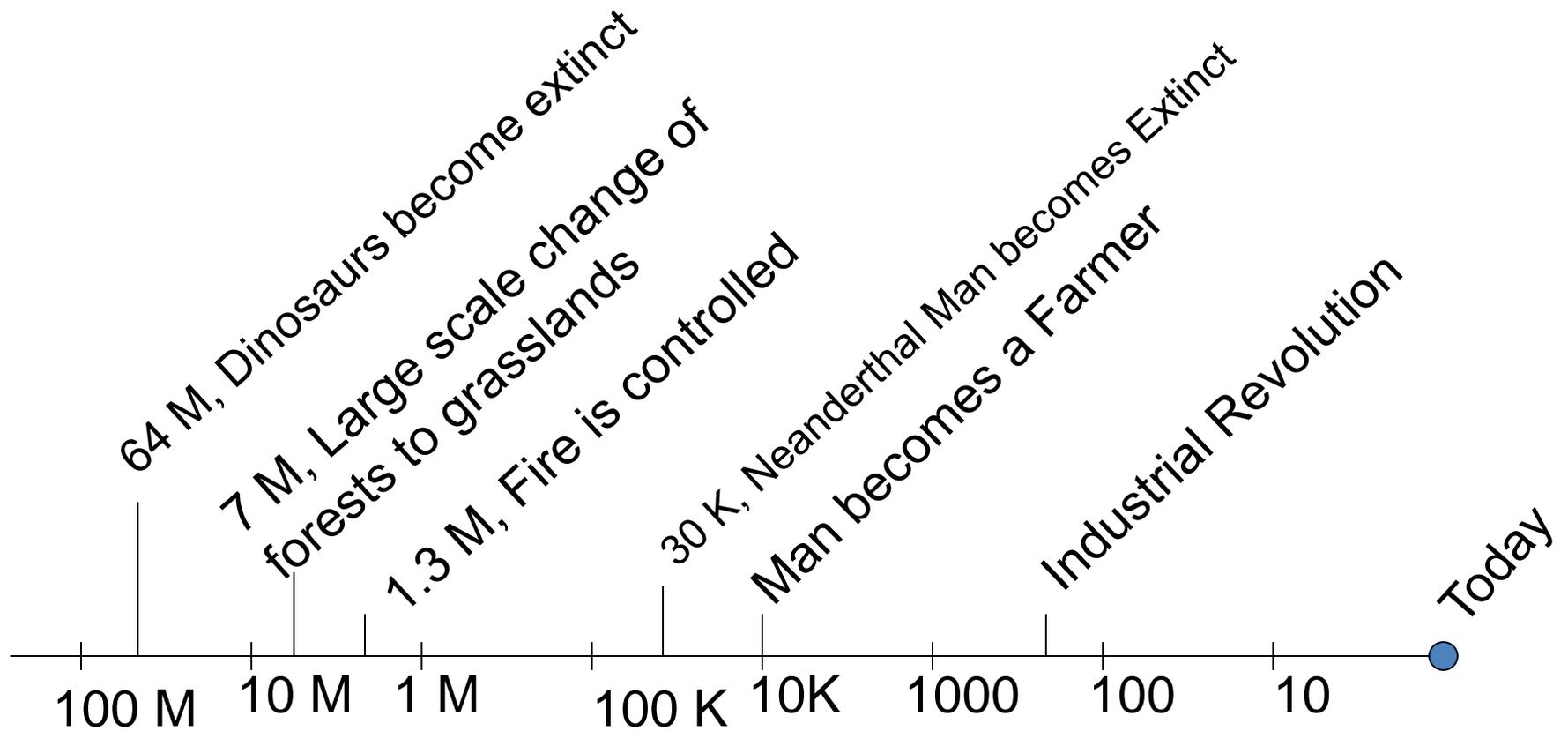
Man's Role in Creation of Deltas

- Time of creation of delta very small in the much larger frame of geological time, such as the billions of years of Pangea and creation of continents?
- Only explanation can be that the Ganges delta (and other river deltas) have been created from anthropogenic or man-made causes in the last thousands or millions of years.
- Cutting trees is Man-made activity that greatly increases erosion and carrying of silt downriver.
(In hills of Malaysia, deforestation has led to much more silt being carried downrivers)

Capabilities of Early Man (Hominids)

- Tools used by Hominids for (> 5?) millions of years
- Fire has been proven to be controlled by Early Man (hominids) for 1.3 million years. Forest fires may have started too.
- Clearly early Man had the capability to cut trees on a large scale for millions of years
- There has been large-scale change from heavy forests to grasslands and savannahs about 7 million years ago.
- Likely that cutting trees by Man going on for millions of years

Man, years ago, in Log Time



Conclusion

- At present rates of land length increase Bangladesh has been created in about the last 40,000 years. Based on rates of silt carried, time is about 40,500 years.
- Owing to silt carrying rates being less in past thousands of years, actual age of ganges delta likely hundreds of thousands of years, or even millions of years.
- Only explanation for creation of river delta can be deforestation leading to more erosion and silt carried by rivers.
- Reduction of forests 7-8 million years ago and control of fire 1.3 million years ago indicate early man was cutting trees for millions of years.

Climate Resilient Bangladesh

- Present changes in Ganges River Delta just part of changes that have been ongoing for millions of years
- Adaptation and Resilience of today's Inhabitants just part of the ongoing adaptation of Man for millions of years.

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