

2025 H2 Geography Lecture

11 part 2- Deltas

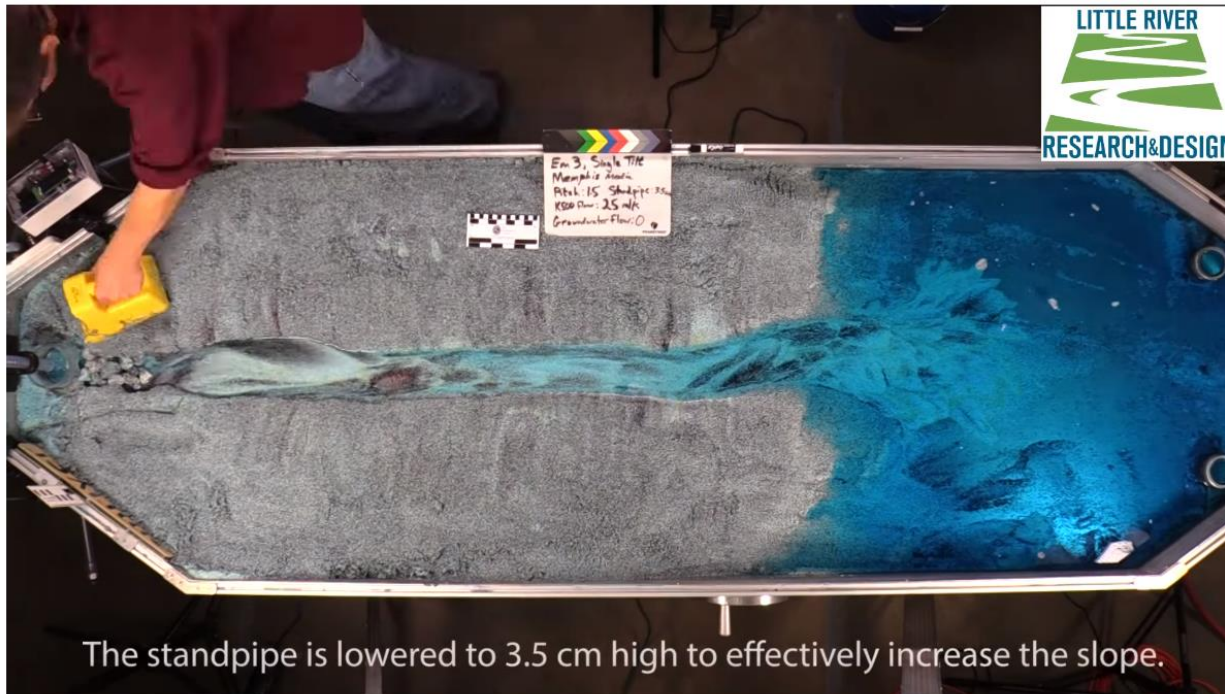
Deltas

- Deltas are fan-shaped deposits formed from built-up layers of sediments deposited by a river where it enters a standing body of water like a lake or calm sea. The river may have to branch into smaller distributaries to carry the water to the sea.



How are they formed?

- Minute Earth: How are deltas formed



Delta Formation in a Stream Table

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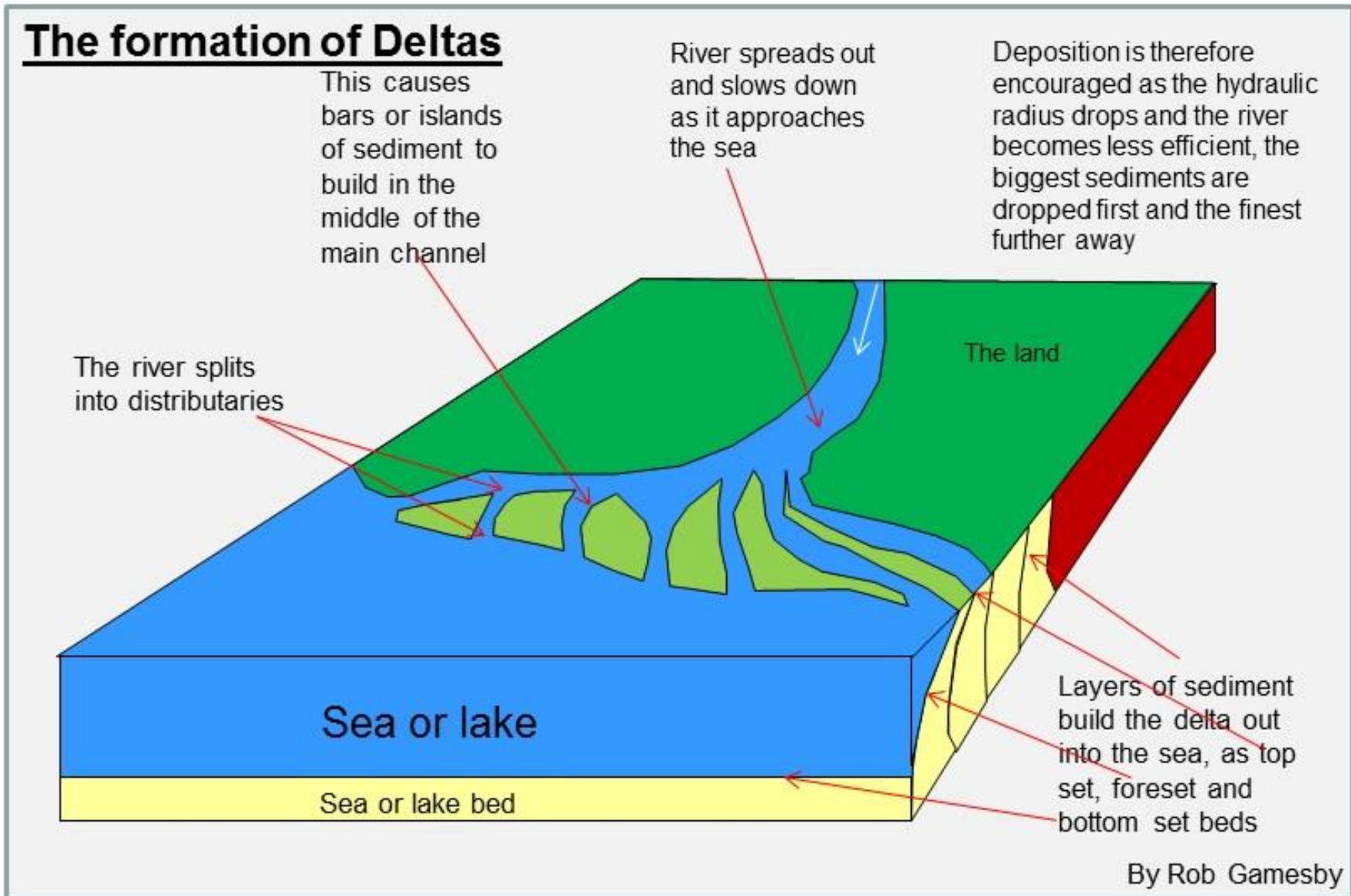


Minute
Earth

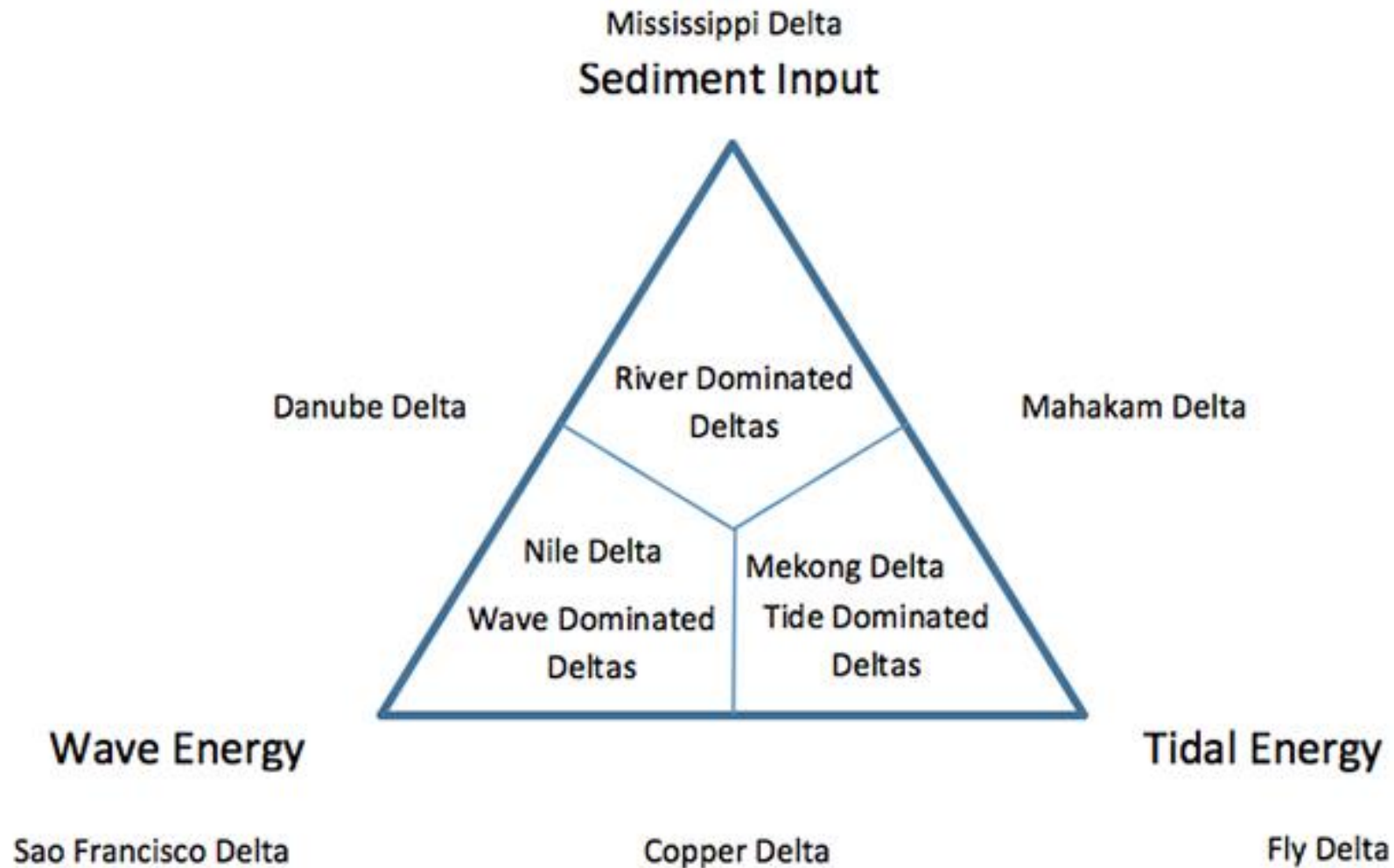
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How are delta's formed



Types of delta



Types of Delta: River Dominated Delta

- Also known as a bird foot delta
- When the river brings down enormous amount of fine silt, deposition can occur in a still sea
- Along with the edges of the distributaries for a very long distance offshore
- E.g. Mississippi River Delta



Types of Delta: Wave dominated delta

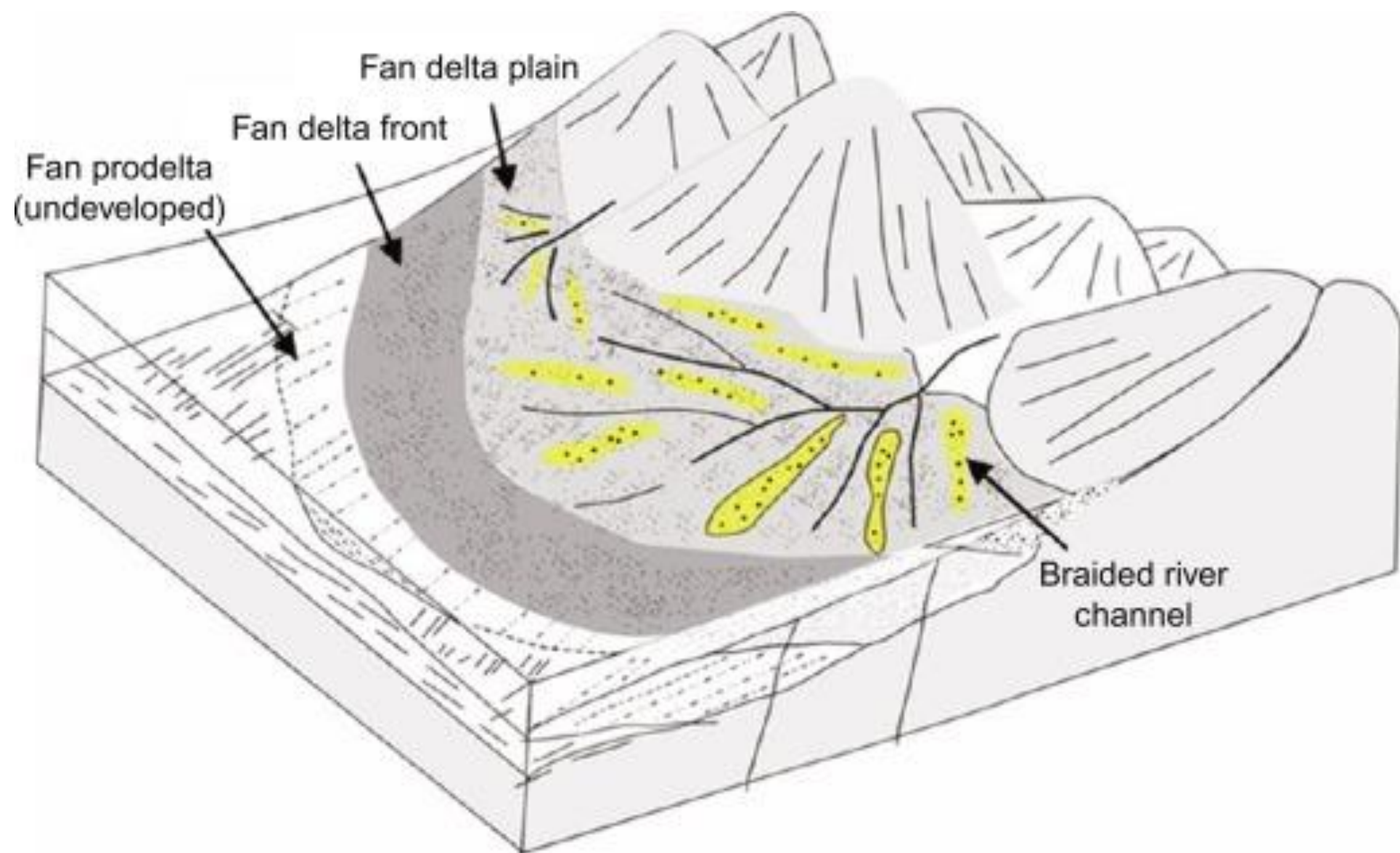
- Wave-dominated deltas are created and shaped by the movements of waves within the body of water in question.
- The waves influence the shape and formation of the river delta by shaping the sedimentary deposits near the river;s mouth.
- The waves move the deposits from the mouth opening towards the shore, preventing a bar from building up
- Because of this, these delta types don't often have many distributary channels or veins, as the flow of the river into the larger body of water is not resisted. The waves also serve as a natural sifting and sorting mechanism because light fine grains are washed away in the waves, while heavy sediments are left behind.

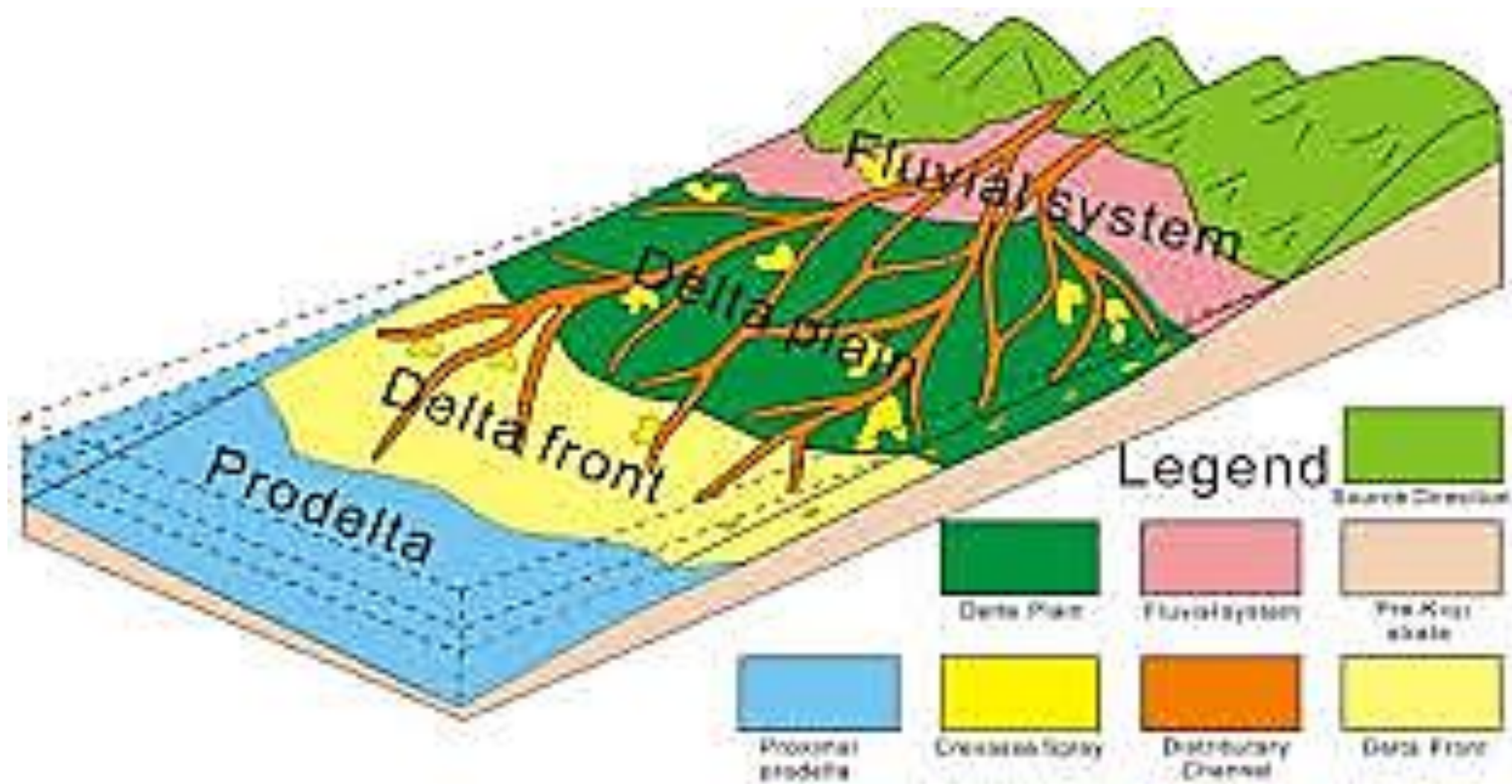


Types of Delta: Tide dominated delta

- Tide dominated deltas are somewhat similar to wave ones, as the movement of water in the delta helps to form the shape and type of river delta that is created, but the resulting shape is very different. In these cases, the rise and fall of the tide is what has the biggest impact.
- Tidal deltas often have many distributaries, as well as dendritic structures due to the presence of sandbars and ridges under the water.
- The changes in the tides can cause certain river branches to become filled or blocked by silt, resulting in the birth of a new distributary.
- Because of this, these deltas have many veins and arms, as the constantly moving tide causes the delta to morph often.







Delta Plains

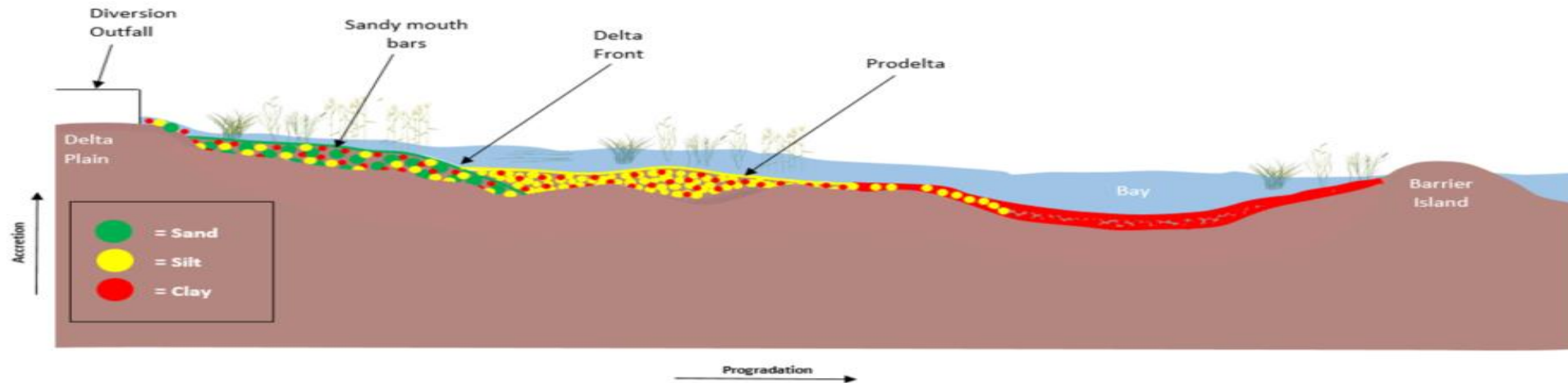
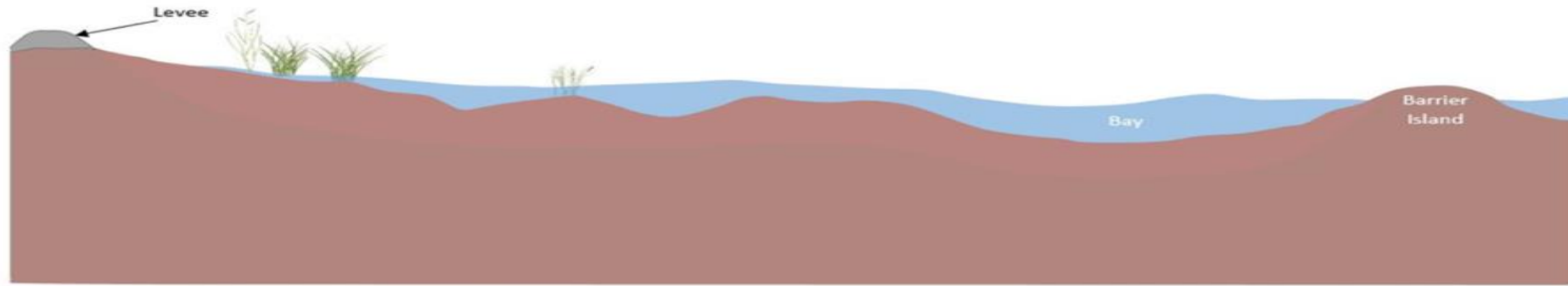
- Delta plains is the sedimentary platform that covers recent seaward advance
- It is a low elevation floodplain formed at the mouth of a river
- It is a visible, low-lying land mass where a river empties into a body of water
- Relatively stable and have distributaries going through it

Delta Front

- The sloping portion of a delta, developed offshore from the bar at the mouth and passing at its toe into the pro-delta
- Delta fronts are the site of active, and often rapid, sedimentation
- It is a shallow, subtidal portion of the delta where erosion and/or deposition and waves/tides are present

Pro-delta

- Situated at the toe of the delta front in relatively deep water and is generally out of reach of wave processes



- The delta builds out because the river continuously delivers sediment to the coastline. The coarsest sediments are deposited close to the river mouth and the finer sediments settle out further seawards
- The delta fronts progrades (move towards the ocean) horizontally while the delta plain aggrades (becomes shallower) vertically.
- The resulting sediment distribution through the delta wedge is the a general fining in the seaward direction and a general coarsening upwards in the vertical directions.

Factors that affect delta's formation

1. Sediment Load
2. Shallow Sea level at the river mouth
3. Sheltered coast with weak tides and current +
Strength of tidal waves
4. Absence of large lake along the course of the river

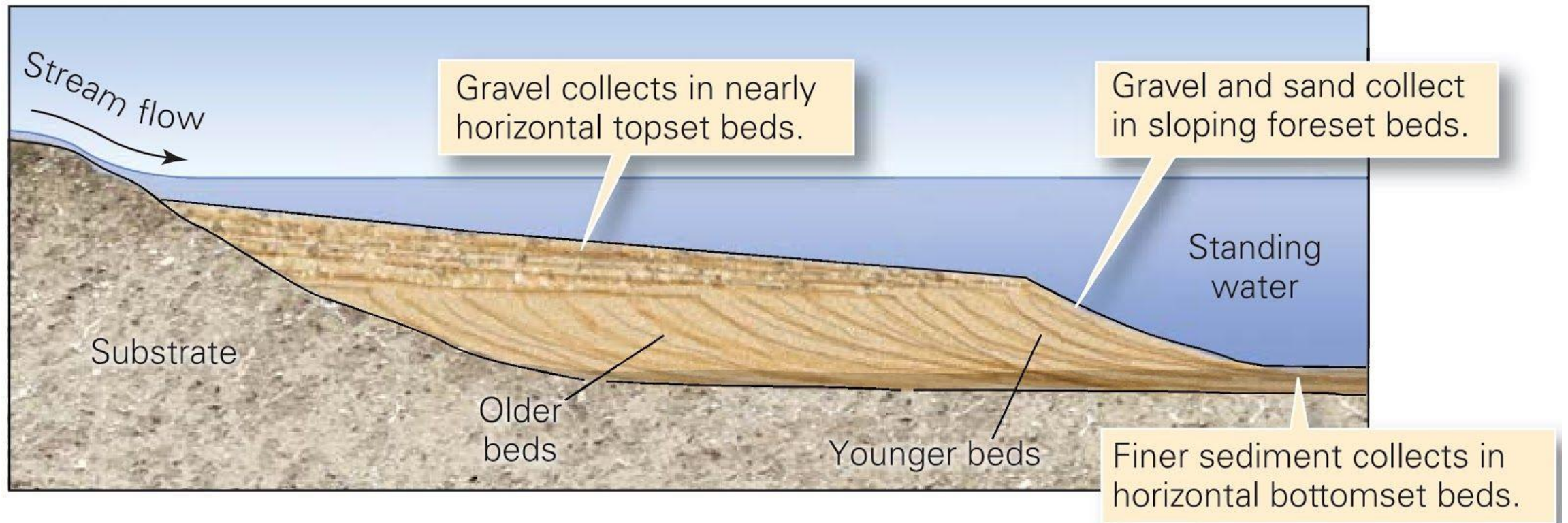
1. Sediment Load

- Sediment load determines the rate of delta formation, a river carrying a large sediment load will have more to deposit when it reaches the mouth of the river. Too little sediment load makes it difficult for the delta to accumulate and form.
- For rivers with high suspended sediment concentration with high discharge, there is potential for the river water to flow out along the seabed. Buoyancy of the sediments limits the mixing between river and basin waters, allowing the river sediment to be transported further into the receiving basin before settling to the bed. As a result the morphology of a river-dominated delta is characterized by pronounced seaward protrusions (e.g. forming a bird-foot Delta)



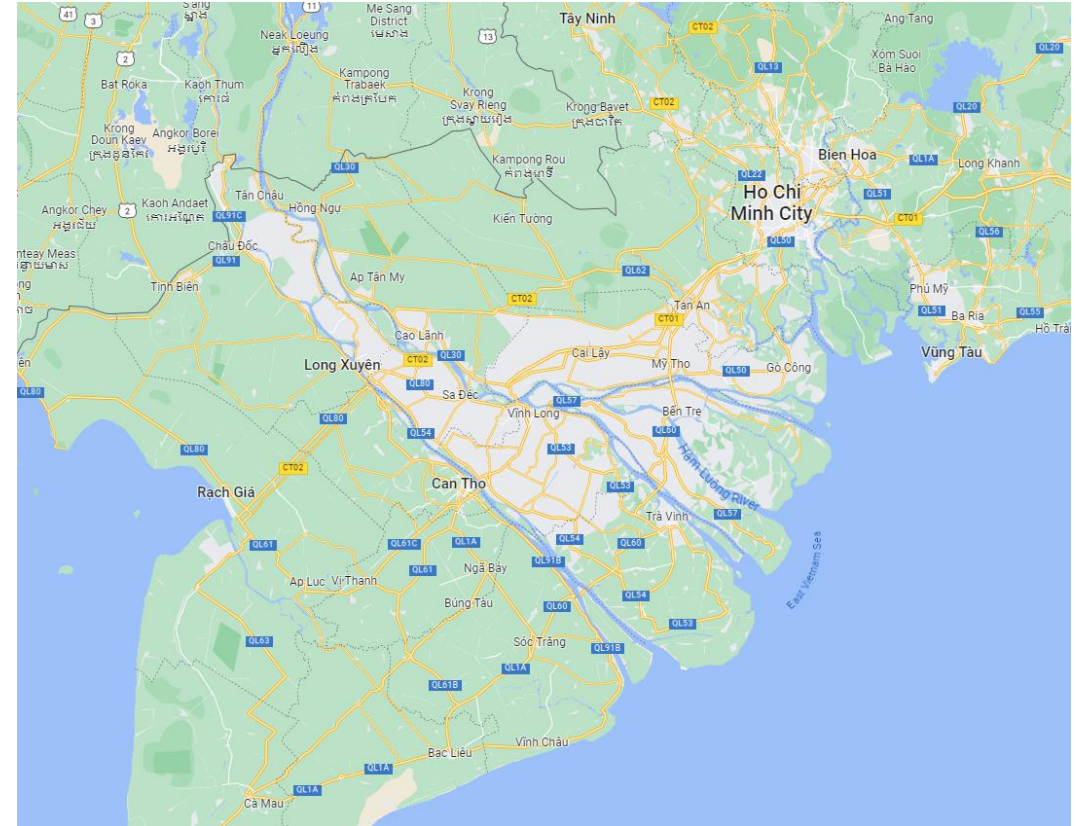
2. Shallow sea at the river mouth

- Shallow sea allows for sediments to sink to the bottom and slowly pile up, if the sea is too deep, it will take a much longer time for the sediments to accumulate and pile up to form.



3. Sheltered coast with weak tides + Strength of tidal waves

- Strong tides will have the ability to wash away (we should use the words: **erode and transport**) the sediments into the ocean when the tide comes in and move out along with the tides. This would hinder and delay delta formation.
- For example, areas with strong tides tend to create tide-dominated deltas such as the Mekong River Delta where the tides cause constantly intrudes onto the deltas and erodes sediment away from the delta front



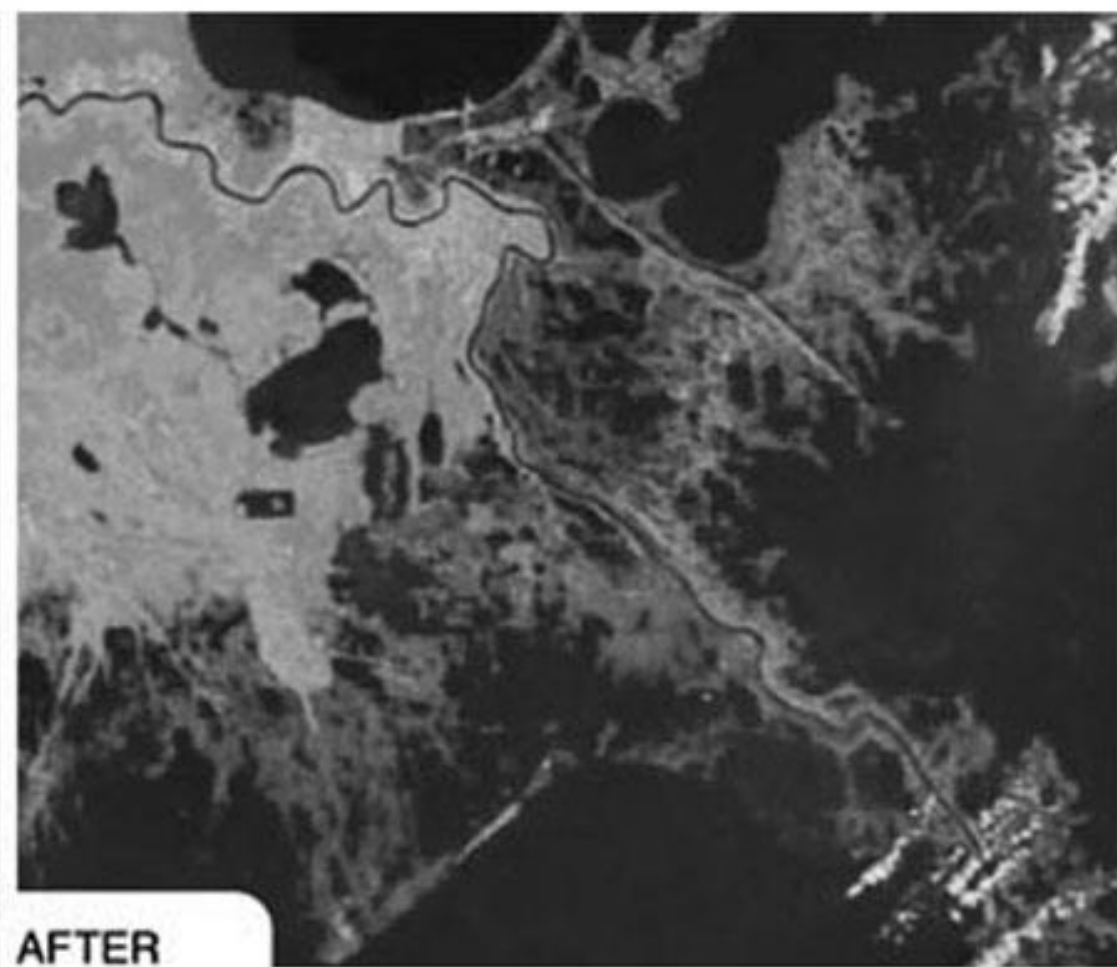
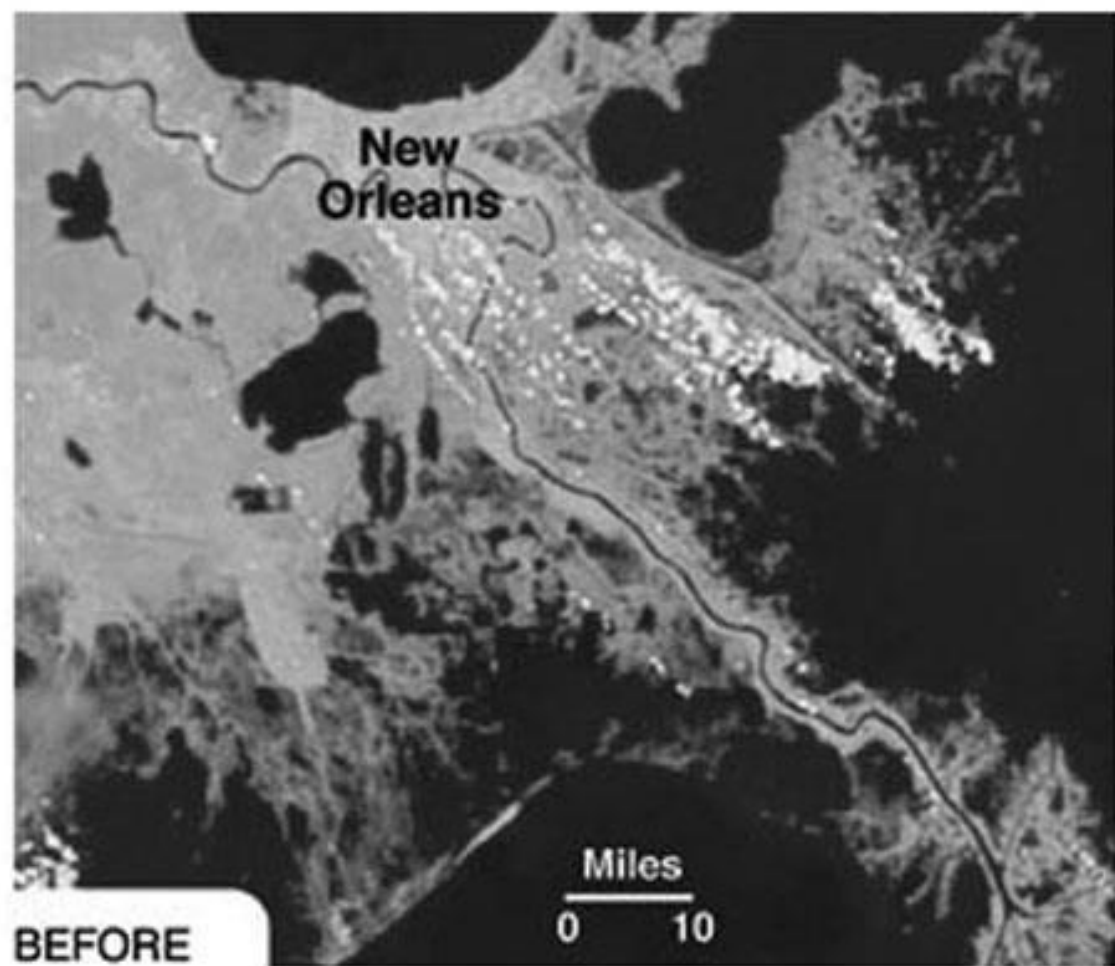
4. Absence of large lakes along the course of the river which will siphon off the load

- Along the course of a river, there could be large lakes which cause the rivers to divert and to transport these carried sediment/load into these lakes instead. One notable example would be the Ton le Sap along the Mekong river.



5. Human Factors

- Humans can modify the sediment supply of a river through actions on land such as building of dams, sediment abstraction and water abstraction for irrigation.
- This can lead to delta erosion since these interventions all reduce the sediment supply to the delta and may cause the deltaic shoreline to erode.
- Erosion problems in deltas are exacerbated by the fact that delta systems are generally subsiding due to the weight of the delta deposits on the earth crust and hence experience a relative sea-level rise.
- Deltas are amongst the most vulnerable coastal environments to sea-level rise and extreme storm events as demonstrated by the devastation caused by hurricane Katrina in 2005.



Ecosystem Benefits of Deltas



When the Mekong floods, it brings crucial sediments to the farming areas. (Photo: Jack Board/CNA)

Farmers like him rely on canals connected to the Mekong to keep their fields irrigated. Rice is a thirsty crop and water is a commodity with