



Theories of Origin of Coral Reef

STAND STILL THEORY OF MURRAY



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MURRAY

Introduction

- There is no dispute about the origin of fringing coral reefs, but the base of barrier reefs and atolls is sometimes at such a depth where it is not possible for the coral polyps to survive. To solve this problem, some theories have been given about the origin of coral reefs, out of which three theories have special recognition. These are –
- Land Subsidence Theory by Darwin
- Stand Still Theory by Murray &
- Glacial Control Theory by Daly

- The most widely recognised & accepted amongst the three theories is the Land Subsidence Theory. It is followed by the Glacial Control Theory & Stand Still Theory respectively.



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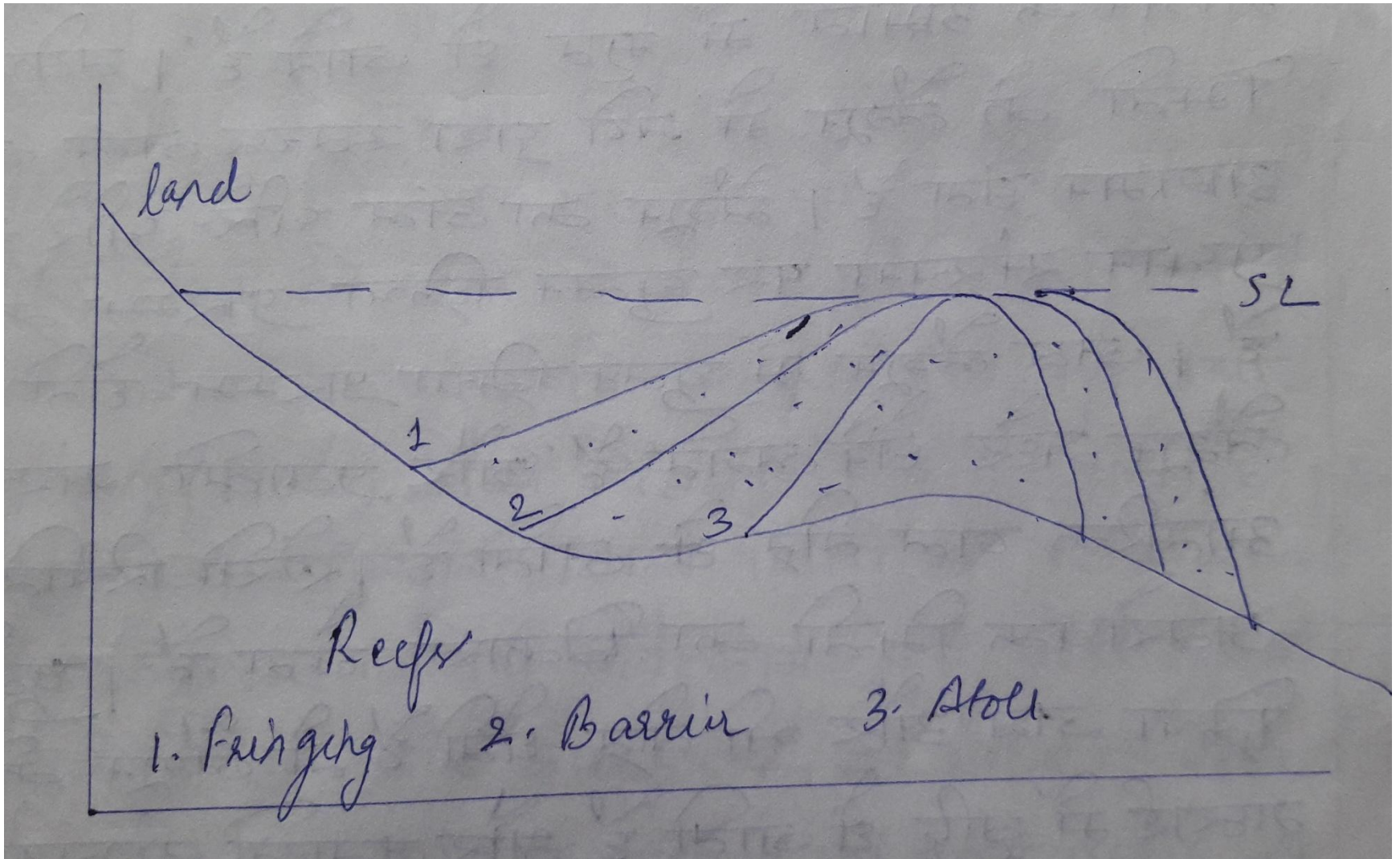
Stand Still Theory

- Murray propounded his theory of the formation of coral reefs in the year 1880 on the basis of the information received during the Challenger expedition (1872-76).
- According to Murray, the development of different types of coral structure is based on the topography of shallow ocean and the effect of lagoon water.
- This view has also been supported by thinkers such as Sempler (1881) and Agassiz (1906).
- According to this theory, for the development of coral reefs it is necessary to have *sub-marine platforms* whose depth should not exceed 54-55 m.

- This suitable depth is obtained by two processes.
- If the sub-marine platforms are higher than this, they are degraded by erosion & solution action and if they are located below this depth, they are subjected to sub-marine pelagic deposition and attain the required depth.
- Coral polyps develop on such platforms in large colonies and together these colonies form the coral reef.
- Initially the reef develops in the form of *fringing reef* and its lagoon is shallow.
- The coral polyps on the outer edge of the platform grows relatively quickly.

- After some time, the coral reef extends beyond a depth of 54–55 m, and after attaining this boundary, small pieces of coral are broken down and deposited on the base of coral reefs. Thus, without the subsidence of land the coral reef extends into the deep ocean.
- The coral polyps living on this pile of debris makes its development outward.
- On the other hand the coral polyps of the inner part of the reef dies due to lack of food.
- The fresh water of the river flows into the lagoon of the fringing reef.

- The water of the lagoon slowly begins to dissolve the lime-dominated structure of the reef.
- When solution action begins in the lagoon, the lagoon begins to deepen and the internal gradient of the coral structure intensifies. In such a situation a *barrier reef* is developed.
- When the solution action becomes more intense, the depth of the lagoon further increases and the internal gradient of the coral structure becomes even more intense. This type of feature is called an atoll.



Stand Still Theory of Murray

- Regarding the construction of the *atolls*, Murray said that they were built independently due to the circular growth of coral polyps at the top of sub-marine platforms and hills that are located at suitable depths.
- In this situation also, the coral polyps on the outer edge of the reef develop at a rapid pace and soon reach the surface to form the ring-shaped coral reef or atoll within which a lagoon is formed.
- Dead coral on the side of the lagoon dissolves continuously in the water, which causes the lagoon to expand, but the outward development of the coral reef continues which increases the size of the atoll i.e. its thickness and width.

Criticisms

- According to this theory, for the construction of coral reefs, innumerable sub-marine platforms & peaks should exist at a depth of 54-55 m, which is not possible.
- According to this theory, the surface of the lagoon is the result of solubility and the maximum depth of the coral reef can be 54–55 m and the depth of the lagoon will not exceed 54–55 m. This assumption does not apply in most circumstances.
- Firstly, the soluble capacity of saline water of the sea is low.
- Second, there is evidence of deposition instead of soluble chemical action at the bottom of the lagoon and

- Third, the depth of many lagoons is 100 m or more.
- It seems impossible to have both erosion and deposition processes at the same depth.
- On the basis of these facts, this theory has been almost rejected and at present it has only theoretical and historical recognition.

References

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