

Examrace

Competitive Exams: Fluvial Landforms

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- Shaped by running water (overland flow and stream flow)
- Fluvial processes are most important of all the exogenetic processes as landforms associated with them have overall dominance in the environment of terrestrial life.
- 3-phase work of fluvial processes - Erosion, Transportation and Deposition
- Normal Erosions: which takes place by natural physical forces.
- Accelerated Erosion: That which is produced by man's interference. Direct force of a falling raindrop (Splashing) . Splash

Erosion

- Surface flow then removes soil in thin layers (Sheet Erosion)
- Steep slopes having torrential rains-produce intense activity -Rill Erosion (innumerable closely spaced channels are formed) - Grows larger forming Gullies (Steep - walled canyon like trench) - A rugged barren topography called Ravines and Badlands are formed. (e. g. Chambal)

Process or types of erosion

- Chemical Erosion: Corrosion (or solution) and Carbonation
- Mechanical Erosion -Impaction (Effect of blow upon the river bed or banks by large boulders)
 - Cavitation (Due to collapse and implosion of air bubbles.) -Attrition (Shattering and breaking up of the stream load through collisions and mutual abrasion)
 - Hydraulic Action (Lifting and quarrying effect of rushing water)
 - Corrasion or Abrasion (Stream uses its load to scrape away its bed, particularly in steep confined sections of stream channels.)

Erosional landforms

- River valleys: Formed in the youthful stage of fluvial cycle of erosion.
- V-shaped in the initial stage (caused by vertical erosion or valley deepening) -3 types of v-shaped valleys:

- Gorge - Steep precipitous wall within which a narrow river is confined (e. g. -Indus, Sutlej, Brahmaputra, Rhine, Zambezi)
- Canyon - A very deep and extended gorge.
- Structural benches - Differential erosion of alternately arranged hard and soft rocks forming step-like valleys known as structural benches. Rapids-Current flowing at more than normal swiftness forms Rapids.
- Waterfalls-Formed due to:
 - Differential erosion of hard and soft rocks
 - Plateau scarp formation (Livingstone, Aughrabies, Gersoppa falls)
 - Because of fault scarps (Victoria fall on Zambezi River)
 - Due to Glacial Hanging valley (Yosemite fall)
 - Fall in sea level and related rejuvenation
 - Other topographical reliefs and earth movements.
 - Due to formation of knock point in a rejuvenating stream Fluvial cycle of erosion is an exogenetic process which erodes the landforms and lowers down the relief which was earlier produced by folding, up warping or emergence of land because of endogenetic forces. Thus a cycle of emergence and lowering down of the relief because of erosion continues. A landform in the early stage of the fluvial cycle of erosion has higher relief and sharp landscape than those in later stages. If by any means the landscape of a later stage encounters emergence because of endogenetic forces at work, the relief is rejuvenated that is the landform seems to have reverted back to an earlier stage. This is known as river rejuvenation.
- Cascade- A fall in steps. Cataract-Larger steps than in a cascade
- Pot Holes-cylindrical holes worn in the solid bedrock (formed as a result of evortion-grinding action of the whirling particles)
- Plunge Pools-Potholes of much bigger size Terraces-step like flat surfaces on either side of the present lowest valley floors are called terraces.
- Structural Benches-The benches or terraces formed due to differential erosion of alternate bands of hard and soft rock beds called structural benches
- Meanders-Bends of longitudinal courses of rivers Misfit Meanders-Meander formed within the extensive former meanders. Meanders are of three types: Wavy, Horse shoe, Ox-Bow or Bracelet
- Incised Meander-Representative features of rejuvenation. They develop through vertical erosion leading to valley incision or deepening Ox-Bow Lakes-Formed due to impounding of water in the abandoned meander loops. Peneplain - It represents

featureless low lying plain having undulating surface and remnants of convexo-concave residual hills. End product of normal cycle of erosion. Frequented with low residual hills: Monadnocks.

Transportation

The size and amount of load and the velocity of stream determine their transporting power. Transportation power is directly proportional to the sixth power of stream velocity

Transportation is done in various ways:

1. Traction
2. Suspension
3. Saltation
4. Solution Deposition

Factors Affecting

It is affected by following factors:

- Decrease in channel gradient
- Spreading of stream water over larger area.
- Obstruction in channel flow
- Decrease in the volume and discharge of water
- Decrease in the velocity of streams.
- Increase in the load etc.

Characteristic of rivers

- A river system is an open system (comprising of collecting transporting and dispersing systems) lying in a drainage basin surrounded by divides called watersheds.
- Tributaries decrease in number in a mathematic progression downstream
- Length of tributaries increases downstream
- Slope of tributaries increases downstream
- Channels deepen downstream
- Water flows in a laminar form (path parallel to the bed)
- Discharge or volume of water = velocity channel cross-sectional area
- Velocity is greatest near the centre

- Base level may be local (a tributary in main river) , temporary (lake) , or ground base level (Sea etc.)
- Erosional power is directly proportional to the square of stream velocity.

Depositional Landforms

- Alluvial Fans and Cones: Formed due to accumulation of materials in the form of fan and cones respectively at the base of foot hills. Alluvial Cones are made of coarse materials than the alluvial Fans.
- Natural Levees - Narrow belt of ridges of low height built by the deposition of sediments by the spill water of the stream on its either bank.
- Flood Plain - Surfaces on either side of a stream that are frequently inundated. Crevasse splays - Formed by breaching of levees when water escapes through a series of distributary channels. Backswamps-Plain area adjoining a levee may contain marshes called Backswamps. Yazoo Streams - Distributions of rivers occupying lateral positions.
- Delta -Triangular deposition at the mouth of a river debouching in a lake or a sea.
- Growing delta -e. g. : Nile, Niger, Ganga, Indus, Hwang Ho, Mekong, Irrawady, Rhine, Volga, . Danube, Rhone, Lena Bird-Foot
 - Also called Finger Delta Rivers with high velocity carry suspended finer load to greater distance inside the oceanic water, (e. g. Mississippi) Estuarine Delta - Submerged under marine water
 - e. g. : Narmada, Vistuala, Elb, Ob, Seine, Hudson.

Factors that help in Delta formation

- Long Courses of rivers
- Medium size sediments
- Calm or Sheltered sea
- Suitable place (shallow sea and lake shores)
- Large amount of sediments
- Accelerated erosion
- Stable condition of sea coast. On the basis of shape delta can be 1. Arcuate 2. Bird-Foot 3. Estuarine 4. Truncated Arcuate (Lobate Form) Semicircular Common in semi-arid region

Drainage Pattern

Spatial arrangement and form of drainage system in turns of geometrical shapes in the areas of different rock types, geological structure, climatic conditions and denudational

history.

- Trellis-In the areas of simple folds characterised by parallel anticlinal ridges alternated by parallel synclinal valley.
- Rectangular-Confluence angle determine by weaknesses like faults, fractures and joints.
- Radial-This centrifugal pattern is formed by the streams which diverge from a central higher point in all directions, eg. Sri Lanka, Hazaribagh plateau, Ranchi Plateau,
- Annular- Developed over a mature and dissected dome mountain characterised by a series of alternate bands of hard and soft rock beds.
- Bar bed- When tributaries flow in opposite direction to their master stream.
- Pinnate-Formed in a narrow valleys flanked by steep ranges e. g. - Upper Son, Narmada.
- Herringbone When broad valleys are flanked by parallel ridges having steep hillside slopes e. g. Upper Jhelum in Kashmir valley
- Parallel drainage- On Cuestas or nearly emerged coastal plains e. g. Western Ghats and some on Eastern coastal plains.
- Dendritic-In the region of flat rolling topography, uniform lithology and impermeable rocks eg. Himalayan rivers.
- Centripetal- Inland Drainage region with depression, basin or crater lake. (e. g. - Kathmandu valley) .

Drainage System

- Consequent- follows regional slope They are the primary streams.
- Subsequent -Those originate after master consequent and follow the axis of the anticlines or ridges and the strikes of beds are called subsequent streams.
- Obsequent -The streams flowing in opposite direction to the master consequent are called obsequent.
- Antecedant -Those which are originated prior to the upliftment of land surface.
- Superimposed -It means a river which, flowing on a definite geological formation and structure, has inherited the characteristics of its previous form developed on upper geological formation and structure are superimposed on the lower geological formation of entirely different characteristics, (e. g. Deccan Rivers) .

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