

Running water

The most imp. Erosional agent (1.36 b km^3)

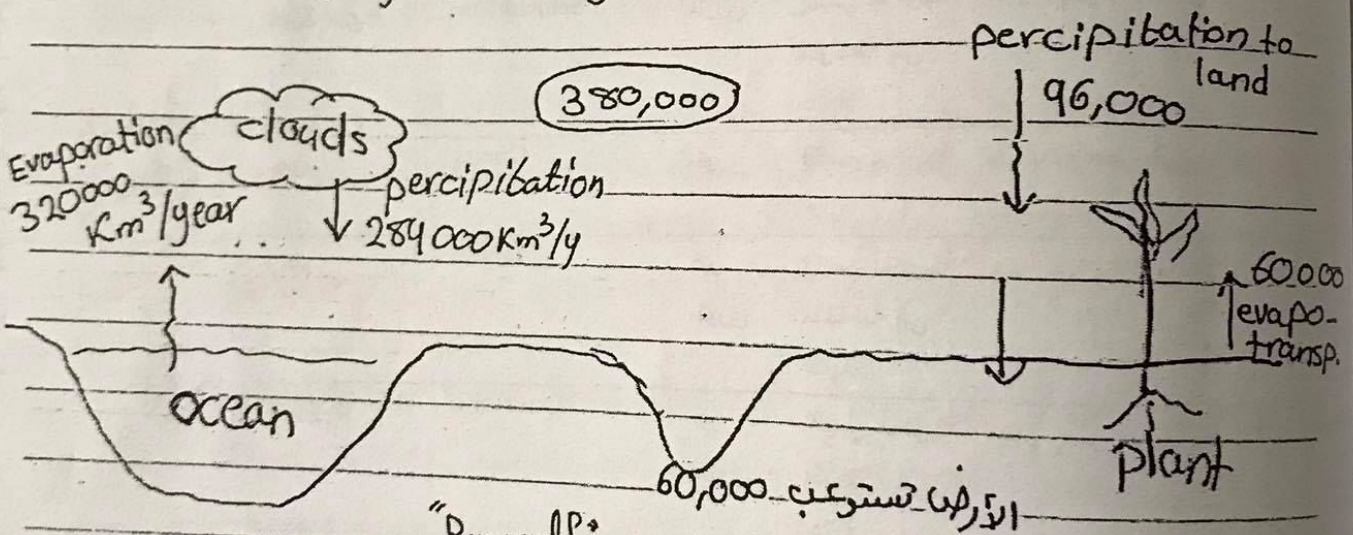
97.2% → in oceans and seas

2.15% → ice sheet & Glacial

0.65% → lakes, streams, subsurface water

and atmosphere (على شكل بخار الماء)

Hydrologic cycle: continuous exchange of water (unending cycle) among ocean, atmosphere and continents



فيبقى 36,000 تعود للبحار "Runoff"

فيبقى مستوى البحر ثابتاً $284,000 + 36,000 = 320,000$

Run-off: that amount of water which exceed the soaking capacity of land
 → the most imp. agent of earth weathering

- * irrigation for plants الأهمية
- * source of Energy " مثل إنتاج الكهرباء في السدود "
- * transport
- * Floodplain Fertile.

Stream: channelized flow of any size, supplied by run-off & underground water.

River: Main Stream

Stream flows "under the influence of gravity"

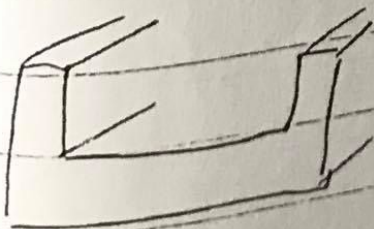
32 km/h تفل سرعته الي
 و أحياناً لا تتعدى 0.8 km/h

⇒ velocity of stream depend on:

* Gradient (slope) of stream ↑↑

* shape, size and roughness of the channel.

عندما تكون المساحة التي يلامسها الماء أكبر
 : تفل سرعة الماء

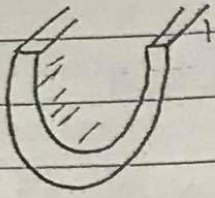


Area = 10

$P = 12$

المكان

$\frac{P}{A} = 1.2$



$$A = 10$$

$$P = 7.9$$

$$\frac{P}{A} = 0.79$$

كل ما كانت فيه النسبة اعلى = تقل سرعة الماء .

As the size of the channel increased ;
then P/A is less.

roughness: $\uparrow \downarrow$

~~كل ما كانت فيه النسبة اعلى = تقل سرعة الماء .~~

كل ما كان الجزء اظن = يقل الماء ، طاقة اكبر = كل السرعة .

* Discharge : Amount of water passing a point in a unit of time.

$$Q = A \times V$$

$$m^2 \cdot \frac{m}{s} = \frac{m^3}{s}$$

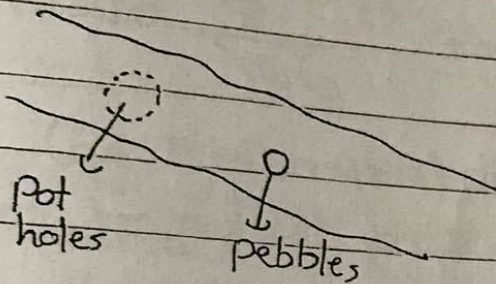
Ex : Mississippi $\rightarrow 17,300 \text{ m}^3/\text{s}$

Amazon $\rightarrow 12$ times of Mississippi

\downarrow
15% of all fresh water
discharged into ocean.

Stream work:

* Erosion: sediments which are carried by water will act as a abrasive agent on the flow of the channel. If there is pebble in sediments it will bore circular holes (pot holes).



* Transportation: Most imp. erosional agent because:
* they are deepen their channels
* has the ability to carry large amount of sediments.

→ Sediments are transported by the stream as:

1) In solution (dissolved load)

dissolved load is brought to the stream by ground water

Quantity carried depend on:

✓ climate

✓ Geological setting

Granite Basalt أو
التركيب الجيولوجي
النهر الذي فيه limestone يكون فيه ذوبان عكس الذي فيه
لأنه كان طين ← ذوبان أكثر

dissolved load is expressed as (ppm)
the av. figure for river is estimated
(115-120) ppm

• ppm: part per million.

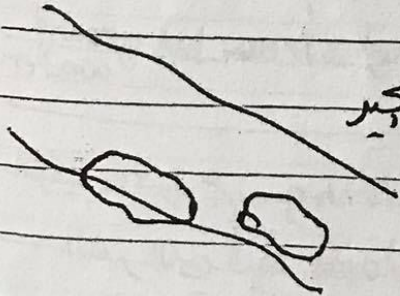
4 billion metric ton per year of
dissolved mat. تلقيني oceans

2) In suspension (suspended load) معلق
Most streams carry the largest parts of
their load as suspension.
"fine-sand, silt, clay"

فيلم مياه النهر

Too thick to drink but too thin to cultivate رعاية
لا تصلح للزراعة فيلم مواد كثيرة لا يستطيع شربها

3) Along the Bottom (Bed load) \Rightarrow 10% of total load
حجارة كبيرة "كل فترة الفيضانات لأنها تحتاج
لسرعة كبيرة"



grinding
action كبير

لما يمشي مع الحجر ببهرار

Rolling تتحرك على شكل
sliding

saltation يطلع وينزل

The bed load usually count 10% of total load of stream, and it moves during flooding.

→ Stream ability to carry load is ^{measured} determined by two criteria: Competence: is a measure of the max. size of particles it is capable of transporting and it is a function of stream's velocity, the stronger the flow the larger particles it can carry, as a general rule the competence of a stream increase as the square of its velocity [if velocity double →

Capacity: max. load a stream can carry, and the capacity is related to discharge ↑ ↑

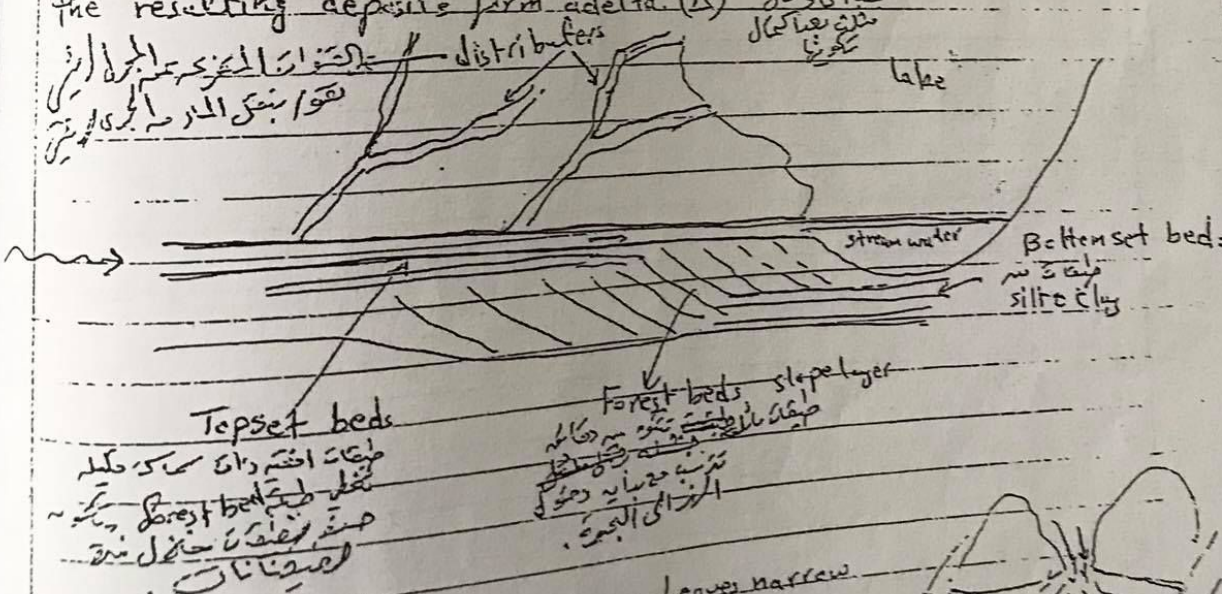
ex. 1 m/s → comp. = 1
2 m/s → comp. = 4
force of water increase 4

6) Deposition:

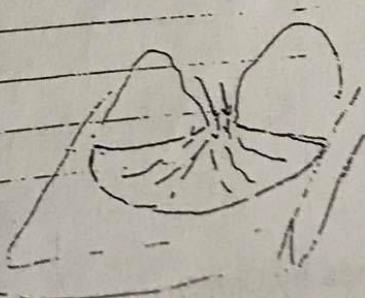
when a stream velocity decrease, its competence decrease, so if the velocity is dropped below the critical settling velocity of a certain particle size so sediments in that category begins to settle out. So the particle size of different sizes are separated.

this process is called "Sorting" well sorted material deposited by a stream called (alluvium) (alluvial)

when a stream enters an ocean or lakes its forward motion is quickly lost and the resulting deposits form a delta (Δ)



Alluvial fans is formed when stream leaves narrow area to open area, so sudden drop of sediments occur in open area due to reduce in gradient. Purely sorted.



Placer deposits:

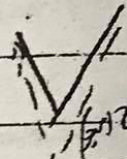
It is a way in which valuable minerals (gold, diamonds, platinum) are concentrated into economically significant accumulations, placed according to S.G [heavy minerals settle quickly]

Stream valleys:

It is divided into two general types:

* Narrow V-shaped valleys

* Wide valleys with flat floor



Sides of most valleys are shaped by a combination of weathering, sheet flow and mass wasting.

Narrow V-shape valley indicate the primary work of the stream is downcutting toward base level.

The most prominent features of narrow valley are rapids and waterfalls (places where the stream profile makes vertical drops)