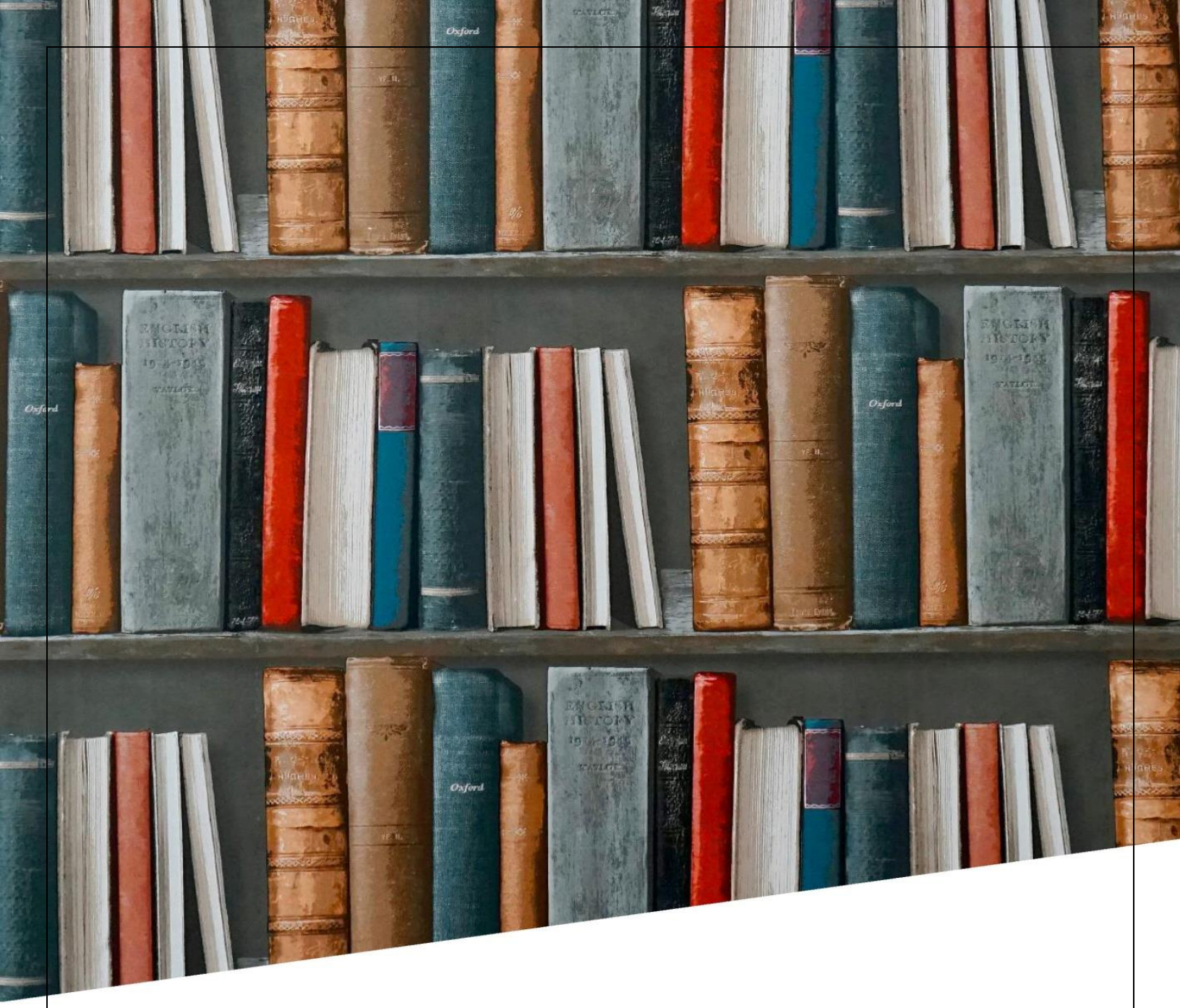


VALUE ADDED NOTES

ILP-2020

IASBABA

Contents

INTRODUCTION

Hello Everyone,

Note- We reverted back to normal format of PDFs as requested by hundreds of aspirants. Kindly do not count number of pages of VAN and be part of impractical debates around it. Focus on its content. And even if you are hell bent to count, do a practical comparison of 4 pages PDF = 1 Page of standard book (Both sides). Further, we have kept VAN very detailed (using images etc. that will eventually make it look bulky) so that larger crowd (who are new to this) can interpret well. If you are experienced, use it accordingly but without being judgmental☺.

Before we start dealing with the topic – Indian Geography, it is important for us to understand that why do we have to study Indian Geography? Or a better question, why is it included in the syllabus of UPSC?

If you think that UPSC's questions can be solved by memorizing the names and places on maps, you will be surprised to find that geography as a subject is something else.

You have to appreciate this subject by having a personal interaction with the natural environment. Try to study the location and distribution of things—tangible things such as rainfall, mountains, and trees, as well as less tangible things such as language, migration, and voting patterns. (Yes, Human Geography ☺)

What if you start observing everything under the Sun, part of geography? The kinds of things you can see whenever you walk outside:

- Clouds in the sky- you will be surprised to see the variation in clouds, which cloud brings rain, what is the name of the cloud that creates thunderstorm and why? Etc.
- Mountains, hills and valleys- their nature, distribution and role in the environmental set up.
- Ocean, rivers, lakes and ponds- their role in climate change, in ecosystem etc.
- The plants and animals that inhabit the landscape.
- Climate, Monsoon, Weather, Temperature etc., why it rains in a sunny day? How can it be?
- Events such as hurricanes, earthquakes, and floods affect our lives and the world around us, as well as how human activities are increasingly altering our environment.

The more you feel them around, the more clarity you will have on them.

Geography as a subject is clubbed with History and Indian Sociology in GS Paper 1. The reason is that UPSC wants you to relate these subjects together.

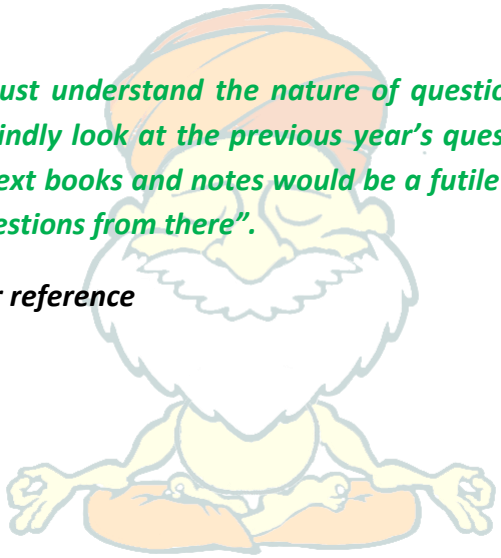
As a civil servant, your job is to be an interface between the Government and the people. Suppose you are from West Bengal, and are posted in Haryana, in order to implement any policy you will have to understand the local people. That is only possible when you understand that society. The society of a region is the direct result of the history and geography of a place.

Geography of a place is important as it defines the culture, values, habits, food, dressing, economy etc. of a place. UPSC wants you to understand the geography of India and not just read it.

You should be able to know India as your home. As in, you should be able to tell what is where, and why is it there.

Must Do: ***Every aspirant must understand the nature of questions asked from Prelims and Mains perspective. If not, kindly look at the previous year's questions of geography, Prelims and Mains both. Reading text books and notes would be a futile exercise if one is not aware of "how UPSC is framing questions from there".***

Refer to below questions for reference



Prelims

Q.1) The property of magnetism in the Earth is due to the presence of

a) *Mg and Fe silicates in the mantle*
b) *Si and Mg rich rocks in the crust*
c) *Fe in the core*
d) *olivine and pyroxeno in upper mantle*

Q.2) Earth's Crust is thinner below the

a) *Continents*
b) *Oceans*
c) *Similar everywhere*
d) *None of these*

Q.4) The sun's rays fall vertically on Tropic of Cancer on 21st of June. It is known as

a) *Summer Solstice*
b) *Winter Solstice*
c) *Equinox*
d) *Heat Island*

Q.5) Sundarbans delta is the largest delta of the world. What type of delta is Sundarban?

a) *Arcuate*
b) *Cuspate*
c) *Bird foot*
d) *None of the above*

Q.6) Consider the following statements regarding Aravallis:

1) *It is the oldest mountain range of India.*
2) *The height of these mountains is still rising.*
3) *It is a type of Block Mountain.*

Which of the above statements are not correct?

a) *1 only*
b) *2 and 3*
c) *2 only*
d) *All of the above*

Mains

Q.1) Landslides have become frequent hazards in the Himalayan regions. Examine the causes of these landslides and measures needed to mitigate them.

Q.2) Examine the importance of Tibetan Plateau in influencing the climate. Why has it been a subject of intense meteorological studies in recent times? Discuss

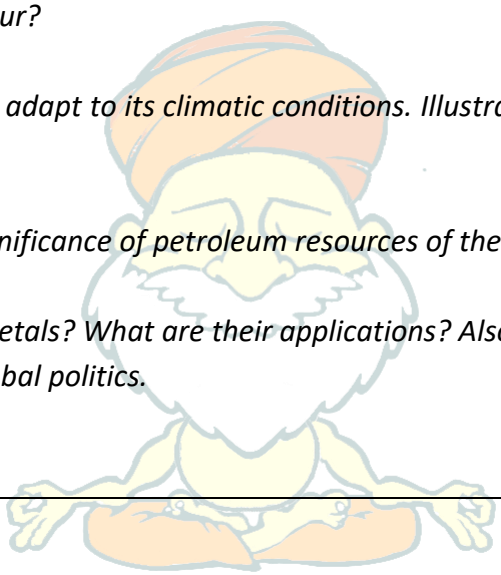
Q.3) Discuss the concepts of volcanism and earthquakes. Also identify the major regions of the world that are affected by these phenomena.

Q.4) Discuss the onset, progress and retreat of monsoon in India. Why there are breaks in monsoon? Why do they occur?

Q.5) Vegetation of a region adapt to its climatic conditions. Illustrate with the help of suitable examples.

Q.6) Examine the global significance of petroleum resources of the Middle East.

Q.7) What are rare earth metals? What are their applications? Also discuss their distributional patterns and associated global politics.

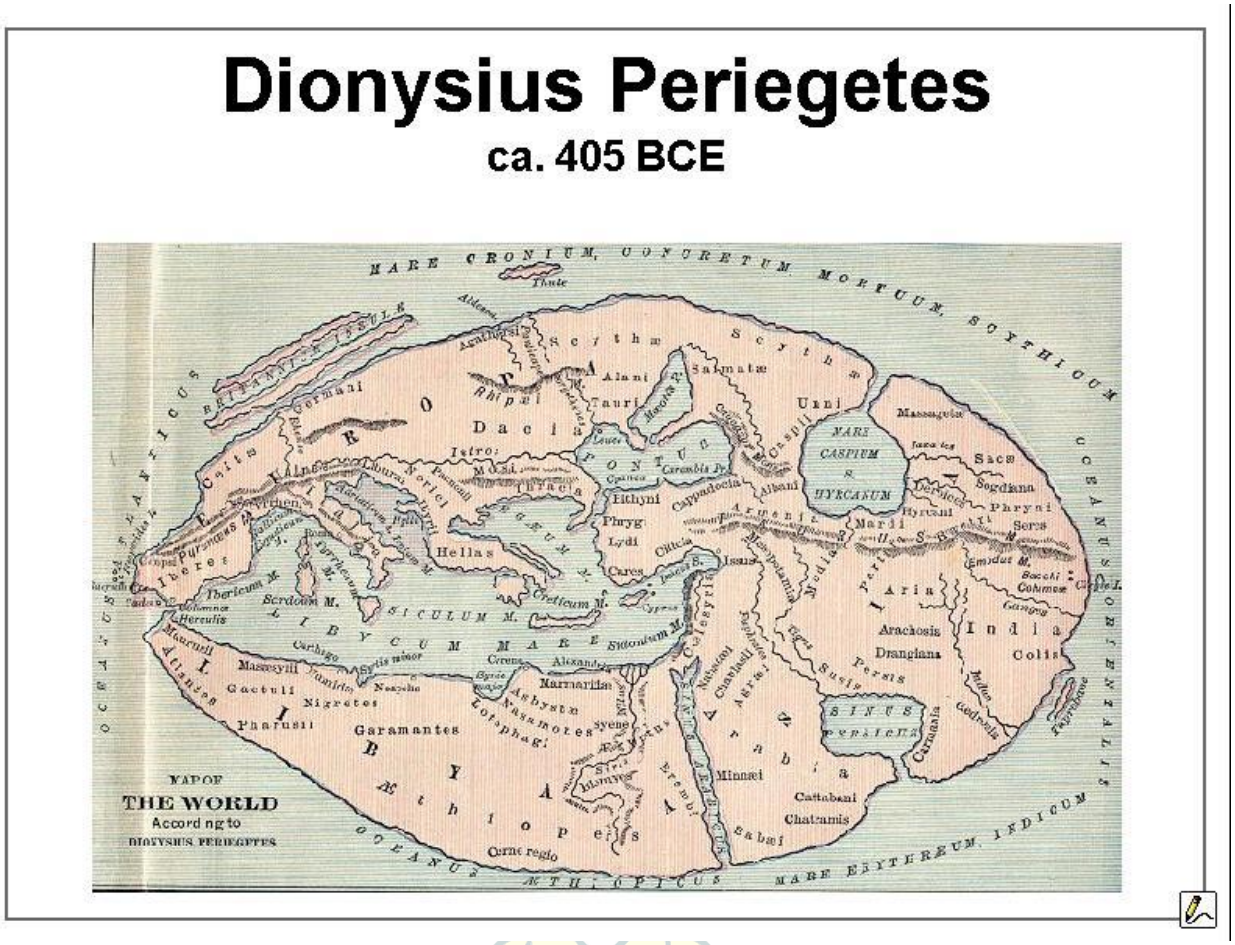


After covering this Module, you should be able to learn: (Geomorphology)

- Interior of the Earth
- Shape of the Continents
- Continental Drift
- Plate Tectonics
- Seafloor Spreading
- Earth Movements and Volcanoes
- Earthquakes
- Weathering
- Mass Wasting and Erosion
- Landforms etc.

And related topics

GEOMORPHOLOGY



One of the earliest maps made by Greeks

Geography is one of the oldest subjects studied by humans. The early man used to study stars and naturals cycles to seek direction and for survival. Inherent curiosity of humans leads them to seek answers of natural phenomenon which they could not explain. Later Greeks started a systematic study of landscape started cartography (map making). Voyages and trade later lead to new discoveries and findings. Eventually the spectrum and ambit of geography expanded and not only the natural features but the reasons of their formations were also studied.

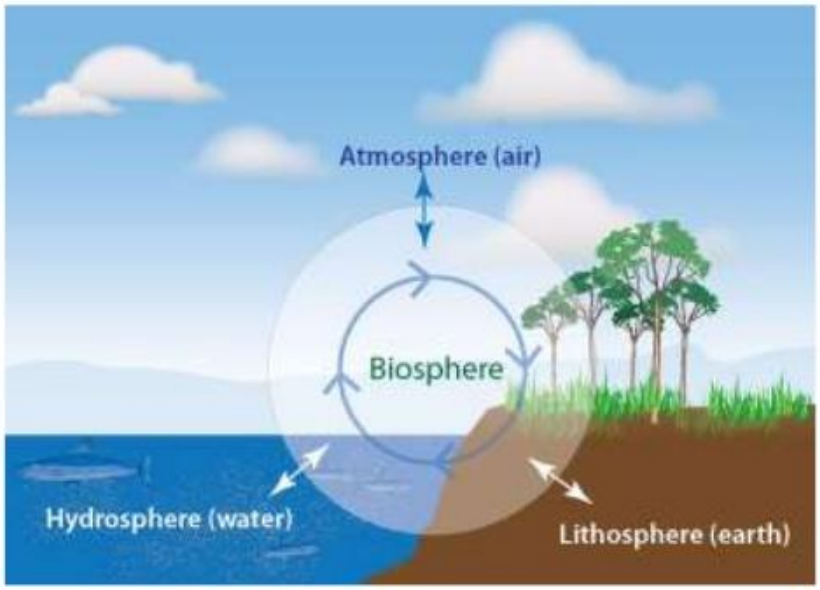
In modern times, four dimensions of earth are studied under physical geography.

1. Geomorphology
2. Climatology
3. Oceanography
4. Biogeography

Now after the realization of the impact of humans on the physical environment, Environment geography has also become an integral part of physical geography.

Four Great Earth Realms

The natural systems that we study, occurs in four great realms or spheres – atmosphere, lithosphere, hydrosphere and biosphere.



The atmosphere: It is the gaseous layer that surrounds the earth. It receives heat and moisture from the surface and redistributes it returning some heat and all moisture to the surface. It also supplies vital elements- carbon, hydrogen, oxygen, nitrogen-that are needed to sustain life forms. Atmosphere and all atmospheric phenomenon are studied under **climatology.**

The lithosphere: it is the outer most solid layer of the earth. It provides platform to most earthly life forms. The solid rock of lithosphere bears a shallow layer of soil in which nutrient elements become available to the organisms. The surface of lithosphere is sculpted into different landforms-mountains, valleys, plains etc. providing various habitats to living organisms. The lithosphere and its structure, is studied under **Geomorphology.**

The hydrosphere: It is the liquid realm, principally the mass of water in oceans. It also includes the solid ice of the mountains and continental glaciers. In atmosphere the water is found as vapors and ice crystals .In lithosphere the water is found in the upper most layers of soil and also underground water. It is studied under **Oceanography**.

The Biosphere: It encompasses all the living organisms of the earth. Life forms on earth utilize the gases of atmosphere, water of hydrosphere and nutrients of lithosphere. Hence it is dependent on all other three great realms.

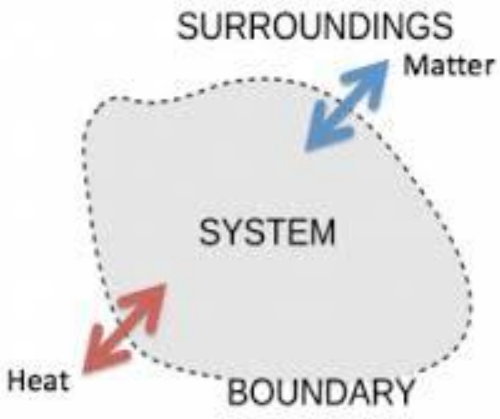
Scales in Physical Geography

The process of four realms occur at various scales-

- **Global scale**: it considers the planet and its global energy balance as a whole and view the sun and the earth from a vantage point far from the earth itself.
- **Continental scale**: the suns energy is not absorbed uniformly by the earth's land and water surface. Unequal solar heating produces currents of water and air. These currents continue the global atmospheric and oceanic circulation system. To study this system we need to look at it at continental scale, where we can distinguish continents and oceans and track winds and ocean currents.
- **Regional scale**: study of different climates of the world.
- **Local scale**: regional climate influence the natural vegetation but the exact pattern is determined by the local factors.
- **Individual scale**: landscape features, type of soils, moss covered bank of rivers etc. can be studied on individual scale.

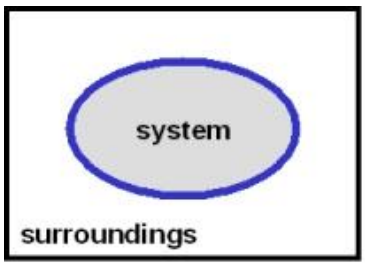
Note: *Sometimes a subject becomes difficult when we don't know how to approach it properly. Many books including NCERTs are not written in a lucid and scientific manner. We, at IASbaba, not only want you to learn a subject, but enjoy and appreciate the beauty of it.* **So from now on in Geography try to relate things from a perspective of above scales.**

SYSTEMS IN PHYSICAL GEOGRAPHY

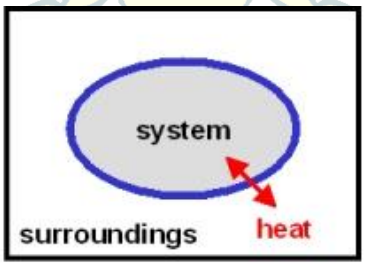


Systems approach is very important for a scientist who studies natural processes – geographers, geologists etc. as their ability to conduct experiments is limited. They must do their work largely by treating earth as their lab, as even the smallest ecosystem is too complex to be replicated in a lab. Using a systems approach they can understand the components and connections with in the systems and can understand and predict the systems as whole.

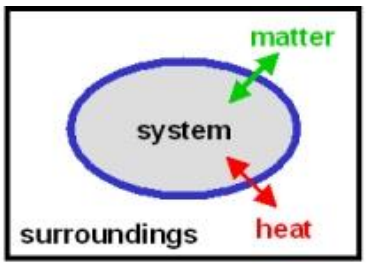
"System" typically means a set or collection of things that are somehow related or organized. E.g. Solar system etc. however, a specific type of system is referred as a flow system in which matter, energy or both move through time from one location to another. Understanding flow system is important as it explains how things are connected and that is how they are related and influence each other.



"Isolated" system:
- no exchange of matter
- no exchange of heat



"Closed" system:
- no exchange of matter
- can exchange heat energy



"Open" system:
- can exchange matter
- can exchange heat energy

INTERIOR OF THE EARTH

"Curiosity killed the cat"…. but fortunately it made man make amazing Discoveries.

For a very long time scientists have been trying to find the exact information about the interior of the earth. What is its physical state, chemical composition, density, temperature etc. But till now exact answers of these questions are not known.

To know about the interior of the Earth, two approaches have been used-

- Direct
- Indirect

DIRECT METHODS

It means physically seeing the internal layers of earth. It includes **drilling, mining, volcanic, eruption, oil rigs** etc. but none of these methods are conclusive. The deepest hole in the earth surface (a drill hole) is only about 12km deep at the **Akola peninsula near the White Sea in Russia**. This is nothing as compared to the radius of the earth which is estimated to be 6371km.

Akola peninsular super hole

INDIRECT METHODS

It means extrapolating the interior of the earth by indirect study. It includes study of **meteorites and seismic waves**.

Our Earth is made up of the same material of the cosmos, the chemical structure and compounds found in the meteor can help in understanding the structure of earth or how was the structure of earth in the early period of its formation.

The most important and reliable method to understand and predict the interior of earth is through the study of '**Seismic Waves'.**

Seismic Waves: Seismic waves are generated due to release of energy during an earthquake. They behave differently in different physical mediums and provide a good idea how the interior of earth must be.

Broadly three types of waves are generated during an earthquake-

- Primary (P) waves
- Secondary (S) waves
- Surface waves

Before we study the action of seismic waves, let's understand what exactly waves are!!

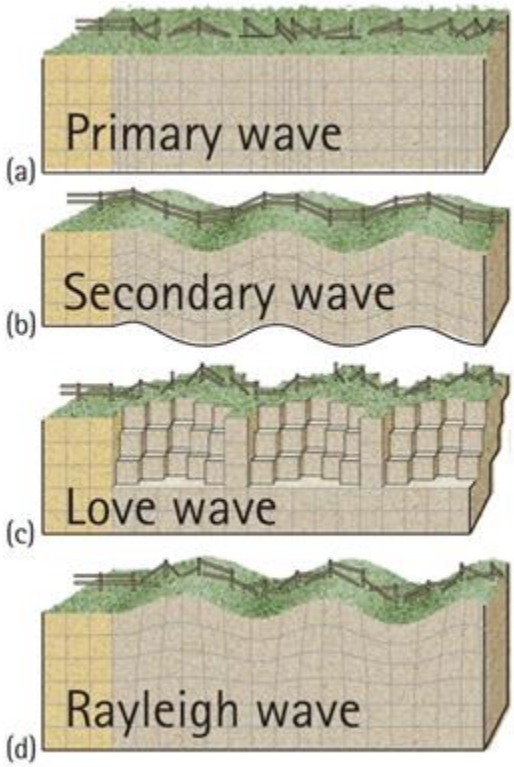
The most common example of waves observed by us is the waves on the surface of Water. If we hit surface of water (which is at rest) in a swimming pool with our hand, waves are generated on the surface. This happens as energy is transferred from our hand to the water. This energy is transferred from a medium in the form of waves. Hence we can conclude that **through any medium energy is transferred in the form waves.**

Also in this case if we put some paper pellets on the surface of the water we will observe that the particles are moving up and down with crest and trough of wave but they are not moving forward with the wave. This shows **that in propagation of wave the actual particles of the medium are not transported. They merely oscillate at their own place and transfer the energy.**

In similar fashion when an earthquake occurs, a large amount of energy is released. It comes out in the form of sound and seismic waves. The seismic waves transport the energy in the earth from one point to other.

Two main types of seismic waves:

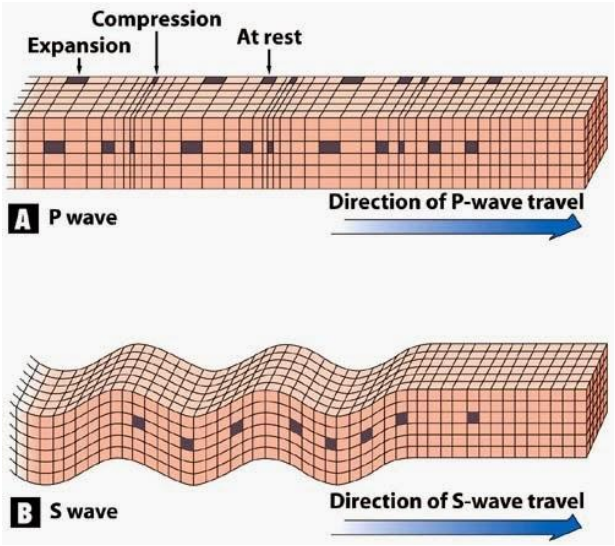
- *Body waves* travel through Earth's interior
  - —Primary waves (P-waves)
  - —Secondary waves (S-waves)
- *Surface waves* travel on Earth's surface
  - —Rayleigh waves
  - —Love waves



Primary waves: (P) – Waves are longitudinal waves. i.e. The motion of particles is in the direction of the propagation of the wave. These waves are the fastest of the three and are detected first. They have the shortest wavelength and highest frequency. They can travel in solid, liquid and gaseous medium.

Secondary waves: (S) - They are transverse waves i.e. the motion of the particles is perpendicular to the direction of the propagation of the waves. They are slower than P –waves. They have relatively longer wavelength and lower frequency than P – waves. These waves can travel only in solid medium.

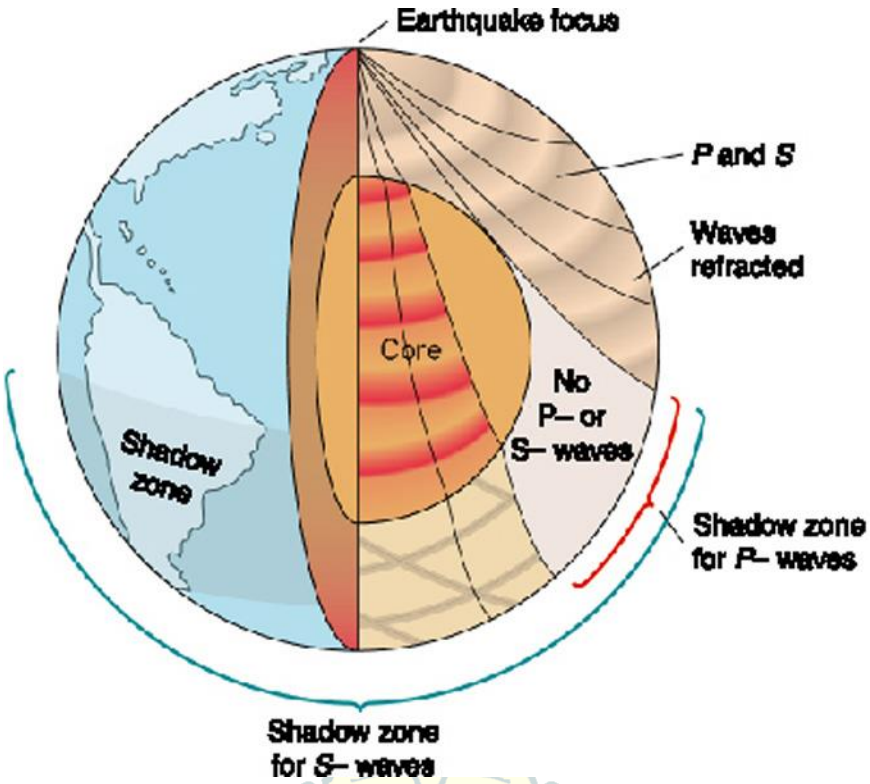
Surface waves: they are the slowest and are detected quite late. They travel only in upper layer or earth surface. They are the most destructive of the three waves. Even the surface waves are of two types – the one travelling in upper crust are **called LOVE waves** and the one travelling in lower crust are called **RAYLEIGH waves.**



SEISMIC WAVE MODEL

Following points show how seismic waves contributed to our current model of layered earth:

- If the earth were homogenous throughout, seismic waves would travel in straight line paths at constant speed. But as it is observed the waves travel in a curved path showing an increase of density as we move in. Also the waves travel much faster than the predicted speed, again showing the increase in density.
- The earth has a dense core producing a shadow zone in which no seismic wave are detected. Shadow zone of P- waves are detected from 103 to 143 degrees, while shadow zone for S-waves is detected above 103 degrees as shown in the figure.



- The pattern of the reflection and refraction of waves shows the presence of layers of different discontinuities of different densities and states. They also show marked discontinuities.

Analyzing the above results, model of earth is predicted.

The Following Video will help you understand the interior of earth nicely. Do watch it.

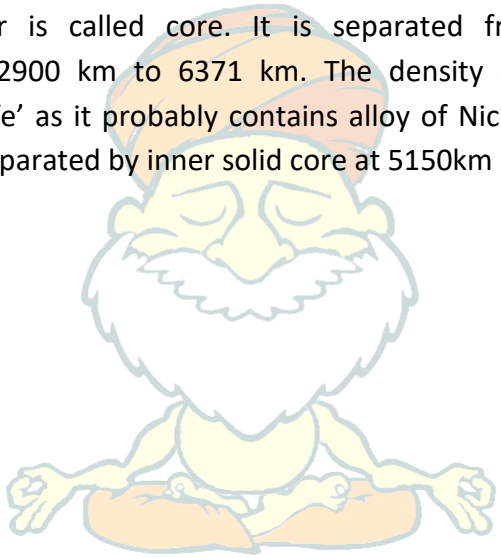
https://www.youtube.com/watch?v=sKZELJDr-4k

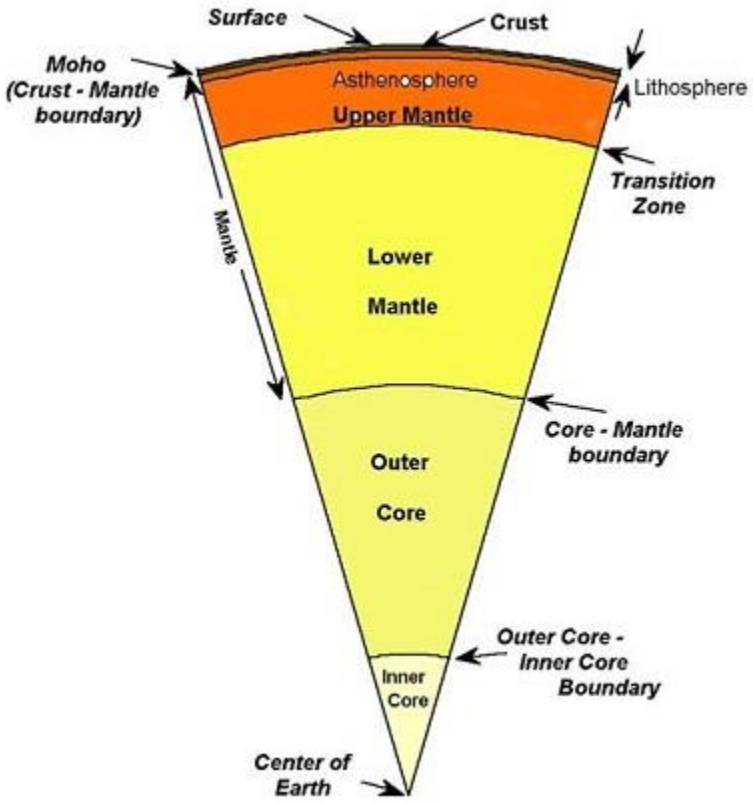
Classification based on chemical composition and density

Crust: The outer most layer or shell of the earth is known as earth's crust. On an average it is 30km deep. It can be up to 70km under high mountains and up to 8km under ocean. It represents less than 1% of earth's total volume and its average density is 2.7 gm/cm3. It is ***known as 'sial'*** because of abundance of silicon and aluminium. It is also divided into upper and lower crust divided by **Connard discontinuity.**

Mantle: The second layer of earth is called mantle. It is separated from crust by **Mohorovicic discontinuity**. Its density ranges from 3.3 to 5.7. It is made of dense and rigid rocks which have the predominance of magnesium and silicon, ***known as 'sima'.*** It is also separated as upper mantle up to 700km and lower mantle from 700 to 2900 km. The upper and lower mantle is separated by **Repetti discontinuity**.

Core: The innermost layer is called core. It is separated from mantle by **Gutenberg** discontinuity. It lies from 2900 km to 6371 km. The density of core varies from 9.5 to 14.5gm/cm3. It is called 'nife' as it probably contains alloy of Nickle and iron. It also has two parts – a liquid outer core separated by inner solid core at 5150km by **Lehman discontinuity.**





Classification based on physical state:

- **Lithosphere:** The top most solid layer is called lithosphere. It is up to 100 km deep including crust and some portion of upper mantle.
- **Aesthenosphere:** It is the second plastic layer under lithosphere. It stretches from 100 km to 400km.
- **Mesosphere:** It is an intermediate layer lying from 400km to 700km in depth.
- **Pyrosphere:** It includes semi solid lower mantle and outer liquid crust. Because of very high temperature it gets its name. 'Pyros' means fire.
- **Barrysphere:** It is the inner most solid core of the earth stretching from 5150km to 6371km.