

## Episode-13

### Who does the work?

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- Vivek : Manav give me a glass of water
- Manav : In a minute Bhaiya
- Vivek : Shrishti when will Daddy be coming .When is Vinod Uncle's train due to arrive?
- Shrishti : The right time is 8 O clock but I think they will be reaching home at 9 O clock.
- Manav : Who is this Vinod Uncle?
- Shrishti : Oh Vinod Uncle, He is Daddy's childhood friend. Tonight he is leaving for USA. He has been invited to deliver a lecture there. That's why he is coming to Delhi, his flight is from here.
- Manav : On what will he be delivering his lecture?
- Vivek : Manav, Our Vinod Uncle is a scientist at NIO that is National institute of Oceanography. He is nowadays working on the effect of global warming on oceans.
- Manav : So why is he going abroad.
- Vivek ; Oh Manav he is going there to share his work and experiences with other scientists, he'll also gain a lot from other peoples work and experiences. (pause) And Manav you were supposed to be bringing a glass of water for me a long time back.
- Manav : Sorry Bhaiya, I just forgot. I am bringing.
- Shrishti : Bhaiya you do remember that Manav doesn't do any work around here.
- Vasudha : You are absolutely right Shrishti, I Have been telling him for so long to bring a Kilo of sugar from the grocers but he is just not paying any attention. Vivek, water for you.

Vivek : This is what is wrong. When I have asked Manav for water let him bring it to me. Why have you brought it. You are the one who has spoiled Manav. He doesn't really do any household work.

(Door bell ringing)

Shrishti : OH Aunty, You, Namaste  
(calling Mummy) Mummy... Malhotra Aunty has come

Malhotra: Vasudha, I wanted a bowl of sugar

Vasudha : Do come and sit, Vivek..... Vivek.....Beta go and bring sugar from the grocer

Malhotra: Oh! Vasudha don't worry if you don't have I wanted it for tea only I'll go and borrow from Mrs. Gupta.

Vasudha : Its no bother, the shop is so nearby. Vivek will just bring it.  
Vivek.....vivek....

Vivek : Going Mummy.....going

Shrishti : Yes sure Vivek Bhaiya will bring it very quickly, but Manav won't definitely bring it. He doesn't do any work.

Malhotra: Don't worry Shrishti he is just a child. After he grows up he'll definitely have to work.

Shrishti : No, Aunty, He doesn't even take water himself we have to give it to him. When he grows up he'll be a nuisance for others. Everyone should have habit of working.

Malhotra: You are right Shrishti, Everyone should be in a habit of working. And everyone should help in the household chores.

Vasudha : You are right Mrs. Malhotra. But this Manav he doesn't listen to me and doesn't understand.

Shrishti : But Mummy where has Manav gone now.

Manav : I'm here Didi and am listening to everything that is being said

Vasudha : If you are listening learn from it as well.

(Sound of running )

Vivek : Here Mummy your sugar (sound of closing door)

Vasudha : Here Mrs. Malhotra, your bowl of sugar

Malhotra : Is someone coming Vasudha?

Vasudha : Ya, Suryaprakash's friend is coming he is a scientist

(Door bell ringing)

Vasudha : It seems they have come

(sound of door opening)

Vasudha : Namaste Bhai Sahab, Welcome... Welcome

Vinod : Namaste Bhabhi, So Suryaprakash ...you're Vivek.. and you must be Shrishti ...and this smaller one must be Manav

All the three children : Namaste Uncle

Suryaprakash : Yes Vinod, You have guessed absolutely correctly. And this is our neighbor Mrs. Malhotra.

Malhotra : I'll be going had come for just a bowl of sugar.

Vasudha : Mrs Malhotra do stay back for a cup of tea it's almost ready

Vinod : We really need a cup of tea.

Vasudha : (calling) Manav could you serve water to Daddy and Vinod Uncle.

Shrishti : Oh Mummy who are you asking to do work. Wait I'm coming to help.

Vinod : Manav, Arrey Bhai go help your mummy.

Manav : Sure Uncle.

Vivek ; Uncle, Your lecture is on warming of oceans is it not?

Vinod : Yes Vivek beta, actually the conference is on global warming

Malhotra : I don't understand. How does all this become warm and cold?

Vinod : (laughs) Bhabhiji, Many forces act in coordination and the thermal circulation in the land, ocean and atmosphere is a very fascinating phenomenon.

Vasudha : Have the tea Bhai Sahab. Manav I have left the tray full of snacks in the kitchen do bring them.

Shrishti : I'll bring it mummy.

Vinod : Well Manavji, Why is it that Shrishti is doing all the work which you have been told to do? Why is it so?

Manav : (worried) No Uncle, it's not true.

Vinod : Okay Manav, Would you like to know what and how the changes in the earth occur? As Malhotra Bhabhi was saying how does the climate, atmosphere and temperature changes on this earth?

Manav : Definitely Uncle. You were saying many forces act together.

Vinod : Right son and these forces keep on working non-stop that's the reason there is life on this earth.

Shrishti : Uncle, Please do have some Namkeen.

Vinod : Thank you Shrishti. So Mrs Malhotra so everybody knows that sun is the source of energy for whatever processes happens on land, atmosphere and oceans.

Manav : Yes Uncle that is what we think also.

Shrishti : Think, it actually happens like that only.

Vinod : You are absolutely right Shrishti, but can you tell me how the energy coming from the sun is transferred to the atmosphere, land and water.

Shrishti : Uncle, I know very little about it, you please explain it to us, We'll be able to understand it better.

Vivek : Uncle, according to me there are three ways of transferring energy. First is radiation. Second is conduction and third is convection.

Vinod : Very good Vivek, you are absolutely right.

Malhotra: He is the most intelligent boy of our colony.

Vinod : Sure, it seems so. So, due to radiation energy travels from one body to another in form of electromagnetic waves.

Vivek : Manav do you know, the food gets heated in the microwave oven with help of these electromagnetic waves only.

Manav : Okay so that is why it gets heated so quickly.

Suryaprakash: Manav do know that the remote you use to surf through channels also uses the same electromagnetic waves.

Shrishti ; And Daddy, Radio, this cordless phone these also work on these waves only.

Manav : Meaning this earth also gets warmed by the electromagnetic waves coming from the sun is it not so uncle.

- Vinod : Very right Manav. Very good. Actually Sun which is a very hot body, Transmits radiation with high energy and these are usually of smaller wavelengths when these collide with the less hot body the earth the waves that return back are of bigger wavelength.
- Suryaprakash: Meaning the earth absorbs heat from high energy waves and return back the less energy waves. Am I right Vinod?
- Vinod : Yes. It's somewhat like that only.
- Shrishti : Uncle Conduction phenomena occur when a cold body comes in contact with a hot body. Like when Mummy keeps the hot cooker on the stand, the stand also becomes hot.
- Vinod : Very good Shrishti. You also know a lot. In convection the rate of transfer of heat depends upon the difference in temperature of the two bodies that if the temperature difference is more the rate of transfer of heat is more.
- Vivek : Uncle this rate of transfer of heat is also dependent upon type of substance. Am I right?
- Vinod : Yes Vinod, For example, in metals conduction is more compared to wood, or hard plastic. Meaning there are substances which are good conductors of heat and some substances are bad conductors of heat.
- Shrishti : For example is a bad example of conductor of heat.
- Vinod : Absolutely correct Shrishti.
- Manav : But then Uncle from where does the heat come from in the air.
- Vivek : Manav the the third phenomenon of convection is useful in this.
- Shrishti : Manav have you forgotten. Uncle told us all about convection. Try remembering.
- Manav : No, ....No, Didi I remember.
- Malhotra: So son, Tell it to Vinod Uncle also.
- Manav : (stammering) Uncle.....Convection meaning warm air or water move up and this is replaced by cold air or water.

- Vinod : (laughs) Okay so Prof. Islam has been teaching you a lot. Excellent, Manav. Convection is a phenomenon seen in gas and liquid. In this when gas or liquid gets heated their density decreases and vice versa.
- Shrishti : Yes, as happens on the equator due to sun's heat.
- Vinod : correct Shrishti. This hot air or water moves up and is replaced by the cold air or water. This keeps on going and is responsible for the thermal circulation in atmosphere and oceans.
- Manav : This I know that that hot water and air from equator travel to cold areas in the Polar Regions.
- Vinod : Wah Manav that means you know about each small big members or forces of the earth's family. Radiation, conduction and convection are such members of mother earth's family who keep on working non-stop and never avoid doing their duties.
- Vasudha : If they start avoiding their duties it will be difficult to sustain life itself. Is it not so?
- Suryaprakash: Wah Vasudha as always you are right.
- Malhotra: (slowly) Its time I should also be going. Actually I have realized I am also a member of my family and I have certain duties I have to perform; I am also one of the forces. Happy's Papa must be dying for his tea. I'll go and do my work now. It was wonderful meeting you Prof Vinod. Bye Vasudha.
- (everybody laughs)
- Suryaprakash: Vinod, It seems your lecture has made someone realize her duties and responsibilities towards the family.
- Vinod : Yaar Suryaprakash, These small, big forces are responsible for the processes going on this earth and that is why life goes on. They all work like a big family giving this blue planet its most unique gift--- LIFE.
- Manav : Life? How?

- Vivek : Oh Manav, Ocean cycle, Wind cycle –which transfer nutrients from one place to another, give rain, snow, climate and seasons to the mother earth. This is all possible due to these forces working together.
- Vinod : Yes, these forces may be either convection, conduction or radiation all help in transmission of energy from one place to another and this is responsible for life on earth.
- Vivek : Due to these phenomenons only our blue planet has life on it. The engine behind the transfer of energy from one place to another, Season cycle, climatic cycle are these forces only.
- Manav : Bhaiya are they all forces or phenomenon.
- Shrishti : What are forces? Force is the power which results into these phenomenons.
- Vinod : Excellent Shrishti. Yes and all these processes lead to changes in pressure, density which results into the dynamics of the whole system.
- Vasudha : Really all this talk is rather fascinating and enlightening.
- Shrishti : Uncle the sun rays may be loosing some of its heat in the pathway before colliding with the surface of earth.
- Vinod : Yes...Yes Shrishti, if this atmosphere will not absorb heat or will not send it back the earth will become a big ball of fire and everything will be finished that is burnt.
- Vivek : But Uncle the atmosphere doesn't become too hot with the heat from the sun?
- Vinod : Yes, Vivek. The Ultraviolet rays are absorbed by the upper layer of the atmosphere and are converted into heat rays.
- Shrishti : This occurs mainly in the ozone layer of the atmosphere.
- Vinod : Absolutely correct. Shrishti, actually atmosphere is made up of different layers, some are hot and some are not. In fact most of the heat is absorbed by the clouds and water vapor present in the lower layers of atmosphere. Along with this the maximum scattering of the rays occur in the lowermost and denser layer which has more dust and water vapor in it.

- Vivek : And some of these scattered rays turn towards the earth's surface.  
Don't they Uncle.
- Vinod : Yes, Vivek, But most of them get lost in the space. The photographs of earth taken from the space, tell us that at any given time the earth is half covered with clouds.
- Vivek : That means clouds not only absorb heat coming from the sun but they also play a major role in reflecting the sunrays back into space.
- Vinod : Agreed VIVEK, And this reflected energy which in small amount reaches the earth that is called as "Cloud Albedo" and when this collides with the earth's surface and is reflected back it is called "Total Planetary Albedo".
- Suryaprakash: Vinod. The reflection of energy is more from snow, ice etc.
- Vinod : Yes Suryaprakash.
- Manav : More from snow or ice why is it so?
- Shrishti : Arrey Manav, rays are reflected more from white things.
- Manav : Really!!!
- Vinod : Yes, but when the sun is straight over the oceans the reflection is less.
- Vivek : So Uncle, as you have told us that earth reflects rays of longer wavelength and so water and atmosphere get heat mainly from radiation.
- Vinod : Yes son Vivek, A bit by conduction and winds on the surface move up due to convection also but the main cause is radiation.
- Suryaprakash: Bhai this longer wavelength heat or energy as you may say is absorbed by the lower layer containing carbon dioxide and water. And this is the main reason for the heat on the earth surface.
- Vinod : Truly said Suryaprakash. That is why as we go up the temperature keeps on decreasing because the heat gets absorbed by the heavy carbon dioxide and water vapor layer in the atmosphere.
- Vivek : So Uncle not only heat gets reflected from the earth but again goes back to the earth.
- Vinod : Yes Vivek



Shrishti : That means there is balance which is maintained.

Vinod : Yes Shrishti, “Total planetary albedo” and reflected radiation from the earth surface in the space are counter balanced by the radiation coming from the sun.

Vivek : That means a balance which nullifies the loss of energy in the space from radiation coming from the sun.

Vinod : Yes Vivek and Ocean play an important role in this balance.

Manav : Yes Ocean acts as storage for energy and then distributes it to cold regions.

Vinod : Very good Manav you know a lot of complicated things.

Vasudha : Come have dinner, the food is ready, Shrishti help me set the table.

Manav : I’m also coming to help

Shrishti : Hey!!!! Manav where are you going? to help or to eat  
(Everybody laughs)

Manav : What didi, when all the forces can act as family let me use my force too.

Vasudha : That’s what she is asking son, you’ll use your forces for setting the table or for eating dinner (laughs).

Manav : Arrey first in setting the table and then eating (laughs).

Vinod : Very good Manav, excellent. It is only because of small contribution from everyone that the wheel of life moves ahead.

Suryaprakash: Come Vinod, Lets have dinner. come Vivek  
(Music for change in scene)

Vinod : I am really impressed. The food was really very tasty.

Manav : Uncle please have some saunf.

Shrishti : Uncle it seems your talk has made an impression on Manav. Till today he has never offered saunf to anyone but has only ordered everyone to bring it.  
(Everyone laughs)

Suryaprakash: Vinod So many processes occur on the planet earth and so many forces work together to make them happen. It is so very interesting.

Vinod : Yes, Suryaprakash it is really astonishing

Shrishti : There is one more force acting that is also very important.

Manav : Which is that force didi?

Shrishti : Arrey gravitational force. Is it not Uncle? That is the reason why the atmosphere forms a blanket around the earth and doesn't disperse.

Vinod : Rightly said shrishti, the earth apart from this gravitational force acts as a big magnet.

Manav : Yes, like a magnet earth too has two poles. But Uncle how did the earth becomes like a big magnet.

Vinod : Manav, Scientist think that Millions of years ago when earth was still a big ball the origin of the magnetic field of earth started off from the magnetic field of the sun.

Manav : But million of years later still the earth behaves like a big magnet.

Vinod : Manav, do you know that how the earth came into existence?

Manav : Yes... yes... definitely.

Vinod : So Manav in the center of the earth, the inner core is solid. Though this inner core has very high temperature due to excessive pressure this is solid. The next layer is the liquid outer core which is about 2200 kilometer in breadth. Now tell me what the next layer is.

Manav : (thinking) Ahem....m.....m....mantle

Vinod : Very good Manav. So this outer core moves between the hard inner core and the mantle.

Shrishti : Uncle this liquid outer core is made mainly of nickel and iron.

Vinod : Yes, Shrishti beta.

Vivek : Uncle Nickel and iron don't have magnetic properties and as the temperature in the core is so high that no substance is able to maintain its magnetic properties.

Vinod : Agreed Vinod. Actually the magnetic field of the earth is due to the electric flow generated by the movement of the liquid in the outer core.

Vasudha : How? I did not understand.

Suryaprakash: Wonderful, Today Vasudha is also taking such a keen interest.

Vasudha : You leave it. Anything can generate curiosity if it is being told in a interesting manner. Not the way you explain boring and dry.

Shrishti : Very good Mummy. Daddy, Mummy's getting all heated up on your conduct that is comment is a good example of conduction.  
(Laughter)

Vinod : (Laughs) it is possible beta but the movement of the outer core occurs due to differences in the temperature of the inner and outer core.

Manav : Inside the earth also convection is going on.

Vinod : Okay Manav do you know what Coriolis force is?

Shrishti : Yes, Uncle this force is produced due to the rotation of the earth on its axis and affects the movement of wind and water of oceans etc.

Vinod : You are very right Shrishti. According to one line of thought "Coriolis Force" is responsible for the ghastly cyclones and also moves the outer core like a roller.

Vivek : Oh Ho ...Now I understand. The moving liquid in the outer core works like coils in the dynamo. Now I got it, because of this circulation we have bipolar magnetic region on Earth.

Vinod : You have understood correctly, Vivek, it works exactly like a dynamo.

Shrishti : Dynamo which makes electricity. Isn't it.

Vivek : Yes Shrishti, It acts like dynamo which makes electricity. The processes which we see outside are really very fascinating but the processes inside are much more amazing.

Vinod : The magnetism of earth is very necessary for life on earth. It does not allow the rays from the sun to reach the earth as it reflects them back.

Suryaprakash: Now come vinod have some rest you have to leave also.

Vinod : Yes Vinod . Now I think I'll take some rest I have to travel a lot. Okay children.

(Music for change of scenes.)

Suryaprakash ; Come Vinod, It will soon be time for your flight.

Vinod : Okay, So we'll meet again when I'll come back.

Shrishti : Okay Uncle, Namaste and good luck.

Vinod : Thank you Shrishti

Suryaprakash : Vivek, Please load the luggage in the taxi.

Vivek : Yes, Daddy.

Manav : Please uncle I'll carry your bags for you.

Vinod : Very good Manav, You carry this one is a bit lighter. You'll be able to carry it. Okay bye vasudha.

Vasudha : Okay namaste Bhaisahab.

Shrishti : Mummy look at Manav How he is helping Vivek Bhaiya to carry the bags.

Vasudha : Its good Shrishti. The knowledge about the forces of the earth has made him forced him to realize his folly.

(laughter)

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