

### Episode 3

**Title - Factors responsible for earth climate system**

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#### **Synopsis :**

This is a story of two kids who, at this early age, are worried about their planet earth and its future. Just like any other kid, they have a long list of questions about earth and its climate. They get their specific answers with the help of their loving and caring mother, their favourite teacher and their neighbour uncle.

#### **Cast :**

**Sumit - A 11 year old boy (brother)**

**Manisha - A 8 year old girl (sister)**

**Sarla - 35 year old female (mother)**

**Rajeev Sir - 28 year old man (Science teacher)**

**Dr Sehgal - 40 year old man (Environmentalist)**

#### **(Scene 1 - School students murmuring in class)**

(Audio : Disastrous sounds continue (like lightning, tide, heavy rain, people shouting, etc.)

**Manisha -** Our school is the best, they show us movies in school as practical exercise... This time they chose a film on climate change... I am enjoying it...

**Sumit -** Hmmm... So much action in this film...

**Rajeev sir -** This is not action, this is reaction...

**Sumit -** What does that mean sir...  
(School bell rings)

**Rajeev sir -** We would discuss the same in the next class... Meanwhile, write an essay about your experience on the film and come up with your questions... We would discuss more about the same...

**Sumit -** Sure sir...

**Manisha -** Good day Sir... Bye...

(Kids bid bye to each other in school)

(School bus horn and vehicles sound on the road)

(Sumit wakes up suddenly)

**Manisha -** What happened brother? What is going on in your mind?

**Sumit -** Do you remember today Rajeev sir taught us about the earth's climate system?

**Manisha** - Yes, so what is there to worry about? It was just a movie...

**Sumit** - No, It was not just a movie... It was an indication of upcoming crisis in the climate of earth... I just saw an unusual dream... I want to reach home as soon as possible...

**Manisha** - We are home brother...

(Sumit, Manisha get down from the bus, bid bye to their friends on bus)  
(Doorbell rings)

**(Scene 2 - Door opens)**

**Sarla** - Hey kids, how are you doing ? How was your day ?

(Sumit moves straightway to his room)

**Sarla** - What happened to him ?

**Manisha** - Maa, It is the fourth Saturday of the month, and as usual we had our educational exercise class where we were shown this movie about the earth and its climate... Brother is a bit worried after seeing the movie... He is actually upset with a sequence in the movie...

**Sumit** (Voice coming from far inside the room) - Maa... I saw an unusual dream on the bus...

**Sarla** - Did you see some ghost in your dream ?

**Sumit** - Worse than that Maa...

**Sarla** - What ?

**Sumit (comes to the living room)** - Maa... I had a short nap on bus... I saw trees crying and falling... I saw the earth tearing apart... There was a yellow light coming out of the earth... there were many other things, I could not make out... Trees were falling inside the torn earth... People were falling inside the earth... I saw heavy rain and thunderstorm like I have never seen before... Also I saw a huge ice which is melting and I saw myself drowning in that melting ice water... I felt like I am choked and I got up...

**Sarla** - Why such a dream?

**Manisha** - Maa, today when we were coming from school, Big Brother and Raghav, his classmate, were talking about the distorting climate of earth...

**Sumit** - Yes Maa, today Rajeev Sir taught us about the various spheres... like atmosphere, hydrosphere, lithosphere, cryosphere and biosphere... We were even shown a movie regarding that... He has asked us to discuss the same with parents and understand the concept better...

**Manisha** - What's the big deal brother? Even we are learning about these factors in our class...

- Sumit -** Yes, you have just started knowing the concept superficially, but we are going in depth of these factors and they affect our climate a lot Maa...
- Sarla -** I know... I understand your concerns dear... Rajeev sir is your science teacher... right?
- Sumit -** Yes Maa...
- Manisha -** Now please stop this conversation, I want to watch TV...
- Sarla -** Its ok Manisha... you watch television and Sumit and I would discuss his concerns...
- Sumit -** Maa, Please listen to me... In the movie, huge icebergs were melting because of the rising temperature which led to increase in sea level... Also, there were floods due to which soil erosion takes place... I had so many questions in mind, but Rajeev sir said, come with an essay on the film shown and questions in the next class...
- Sarla -** Dear, recently Kerala floods were in news... The situation there has been very bad... Similar situations were there in Mumbai in 2005, Leh in 2010, Uttarakhand in 2013, Jammu and Kashmir in 2014, Chennai in 2015 or Saurashtra in 2017... Kerala too experienced unusually high rainfall...
- Sumit -** But why so Maa ? What is the reason of such heavy floods in Kerala ?
- Sarla -** I have kept an old newspaper cutting regarding this news... I would show you that...
- (Sarla opens a drawer and gets a newspaper cutting)  
(Sound of a table drawer opening and a newspaper page being unfolded)
- Sarla -** It reads - In context of Kerala, three major transformations can be clearly identified... First - Kerala has lost over 0.4 million hectares of natural forests and 0.25 million hectares of wetlands to agriculture, plantations and infrastructure development... Second, land used for non-agricultural purposes has more than doubled in the last 50 years... In the last 10 years itself, Kerala has diverted 70,000 hectares of land for housing and infrastructure... Third, traditional crops have been replaced with plantations of rubber and other commercial crops. These drastic changes in land use have destroyed the watershed; impeded the flow of rainwater; and, reduced the ability of the land to soak water. All these factors aggravated the floods.
- Sumit -** Ok... But why so ?
- Sarla -** It is complicated son... An a bit technical too... I would help you with this but not right now... Have your lunch first... then do your homework... Read your science chapter on climate change once again... Write your essay, prepare your questions... and then I would try to help you with the same...
- Sumit -** Ok Maa, that would be the first thing I would do...
- Sarla -** Tomorrow is Sunday and this time Sunday would be exploration day...

**(Scene 3 starts with the chirping of birds which indicates - ‘Good morning’)**

**Sarla -** Breakfast is ready, but kids are still sleeping... They were so upset yesterday...  
Meanwhile let me call Rajeev sir...

(Phone bell rings)

**Sarla over phone -** Hello, Is that Rajeev Sir...

**Rajeev -** Yes speaking...

**Sarla -** I am your student - Sumit’s mother...

**Rajeev -** Hi... How are you doing Mam ?

**Sarla -** I am fine sir. I wanted to invite you for breakfast at my home today.

**Rajeev -** Something special ?

**Sarla -** You please come over, then I would brief you everything...

**Rajeev -** Sure, I won’t take much time as you know I live nearby... I can smell the breakfast  
from here... See you in half an hour, i.e. by 10.

**Sarla -** Sure sir... See you then...

**(Scene 4 - Mother knocks the door)**

**Sarla -** Kids get up quickly, someone is coming to see you both...

**Sumit, Manisha -** Ok Maa...

(Door opens)

**Sarla -** Get ready for breakfast and to meet the guest... You would enjoy the breakfast  
thoroughly...

**Manisha -** What’s there in breakfast?

**Sarla -** Get ready first and be quick...

**(Scene 5 - Everyone on the dining table... Rajeev Sir arrives)**

**Rajeev sir -** Good morning everyone...

**Sumit -** Good morning Rajeev sir... you at our home... what a pleasant surprise...

**Rajeev Sir -** Surprise...??? But your mother called me...

**Manisha -** Good morning Rajeev Sir... Maa called you home...???

- Sarla** - Yes. I called him... Good morning Sir, the breakfast is ready... Let's start...
- Rajeev Sir** - Also tell me what is the matter ?
- Sarla** - Sumit is very upset about our planet earth and the consequences of rapid climate change...
- Manisha** - Yes sir, He even saw a dream yesterday on school bus...
- Rajeev sir** - What kind of dream ?
- Sumit** - Sir I saw tress and human beings falling inside the earth, ice melting, I was drowning in that melted ice... It was horrible sir... Is this actually happening ?
- Rajeev Sir (laughs)** - Kids mind run very fast... Yes, things are worrisome, but you need to understand the basics first...
- Sarla** - We are done with the breakfast... Let's move to the kid's room...
- Manisha** - I would take sir to our room, please come sir... this way...
- Rajeev sir** - Sure, Let's see your room... and let me explain you the basics first...
- Manisha** - Wow Maa... Now what is this big map ?
- Sarla** - Sir is here to explain you this map... Just be silent and listen to him carefully...
- Sumit** - But Maa I have so many questions in my mind... I have noted down many as well...
- Manisha** - We would ask questions but let's listen to sir first...
- Rajeev sir** - That's good... So can you make something out of this picture ?
- Sumit and Manisha** - Our Earth... It is all blue...
- Rajeev Sir** - It is so beautiful... Yes it is blue because of its water content... You know kids, more than 70% of the earth is water... and it makes the hydrosphere... here hydro means water...  
The Earth's hydrosphere is made up of all the water on the planet that can be stored in the oceans, rivers, streams, groundwater, or water vapour...
- Sumit** - Earth is made up of 5 parts... Apart from Water i.e. hydrosphere, there is Land i.e. lithosphere and Living beings i.e. biosphere and Air i.e. atmosphere... I know this sir...
- Rajeev sir** - But you don't know there is one more - Ice i.e. cryosphere... Similar to the hydrosphere, the cryosphere also contains the planet's water... However, this subsystem consists of solid water... It is actually frozen water but forms a completely different category... It is found at many locations on Earth... but mainly in the area around the North Pole i.e. the Arctic and the area around the South Pole i.e. the Antarctic...

**Sumit** - The same ice that I saw melting... Sir can it actually drown our earth ?

**Rajeev sir** - Yes it can, there is so much water in the form of ice on earth that if it all melts, it can drown our earth... but cryosphere is like a reflective blanket, that protects Earth from getting too warm... Snow and ice reflect more sunlight than open water or bare ground... The presence or absence of snow and ice affects heating and cooling over the Earth's surface, influencing the entire planet's energy balance...

**Manisha** - Hawww ! There is so much we don't know about our planet earth...

**Rajeev Sir** - Yes, I am sure you want to know more... So, Now Let's goes out... When we are talking about nature... We should go close to it...

**(Scene 6 - All of them move out to the park)**

**Rajeev Sir** - Kids... pick up some mud in your hands... And try to feel it...

**Sumit** - Oh ! This is a part of the lithosphere... With mud I could pick some small stones... some slimy matter and some particles of plants... I guess !

**Manisha** - I could also pick stones... dry leaves... and off course mud...

**Rajeev sir** - Good... What I wanted to implicate by this exercise is that, The lithosphere is made up of all the hard and solid land mass on the earth's surface, there are semi-solid rocks underneath the earth crust, and the liquid rocks in the inner core of the earth... The surface of the lithosphere is uneven as it includes mountains, deep valleys, huge plains, plateaus and hills... Above all it contains all the necessary minerals for life sustainability... The actual thickness of the lithosphere varies considerably and can range from roughly 40 km to 280 km...

**Sumit** - Which is more important - Lithosphere or Hydrosphere ?

**Rajeev sir (laughs)** - You tell me, what is more important - the water you drink or the land you stand on ?

**Sumit (thinks for a while)** - Both are equally important...

**Rajeev sir** - There are a few more, like the next one which we cannot see but can't sustain for more than a minute or two, without it...

**Manisha (excitedly)** - Sir, Air... We can't see air... But it is the most important part of our life...

**Rajeev sir** - Both of you... Stop taking breaths and let's see how long you can manage without air, rather oxygen...

**(Sumit, Manisha holding their breaths)**

**Sumit** - I can't hold it anymore...

**Manisha** - Me too...

**Rajeev sir** - Now, Take deep breaths...

(All of them breathe i.e. inhale and exhale forcefully with some ambience)

**Sumit, Manisha** (Simultaneously) - Wow !!! It feels to good... Seems like we have never taken deep breaths...

**Rajeev sir** - You have already studied atmosphere in detail... Do you remember anything ?

**Sumit** - Yes sir... (just like answering a question in class) The atmosphere is a mixture of nitrogen (about 78%), oxygen (about 21%), and other gases (about 1%) such as carbon dioxide (0.039%), argon (0.93%) and the rest are trace gases krypton, neon, helium , and xenon...

**Manisha** - We breathe in Oxygen and give out Carbon di-oxide...

**Sumit** - Hahaha... Thank you so much for telling... as if we don't know...

**Rajeev sir** - its ok... So till now we discussed hydrosphere, cryosphere, lithosphere, atmosphere... Next on the list is biosphere...

**Mansiha** - I know, all the living things in the planet are categorised under the biosphere... It includes all of the animals, plants, and microorganisms of earth... We also belong to this group...

**Rajeev sir** - Very good Manisha... Actually, the entire ecological communities within the physical surrounding of the earth are within the umbrella of living things, the biosphere. These ecological communities interact together with the physical aspects of the earth including the hydrosphere, cryosphere, lithosphere, and the atmosphere...

**Sumit** - Sir, now as we know more or less about these factors responsible for the earth's climate system, but I am still not clear about how the total of the factor s discussed are responsible for the earth climate...

**Manisha** - Hey, Let's go inside, it's too hot out here... the sun is burning making us burn too...

(All of them start walking towards home, so sound of footsteps approaching)

**Rajeev sir** - Ok, while walking home, I want to tell you that almost all of the energy that affects the climate on the Earth originates from the Sun... This energy passes through the space and hits the earth's atmosphere. Only 40% of it reaches us, rest is reflected or absorbed through the atmosphere...

(Scene 7 - All of them return home)

**Sarla** - Hey, you are back... I came out to see you, but you were not here...

**Rajeev sir** - Actually I took the kids to the nearest park...

**Sarla** - So, the lesson is over ? Kids did you understand anything...

**Sumit** - She understood everything Maa... But I have some more queries...

**Mr Sehgal** - Good afternoon children...

**Sumit, Manisha** - Good afternoon uncle...

**Sarla** - Good afternoon sir...

**Mr Sehgal** - What is the matter Sarla ? Why did you call me here on a Sunday ?

**Sarla** - For my kids sir... actually they are studying about the earth and its various components like lithosphere, hydrosphere, cryosphere, atmosphere and hydrosphere... but their mind has so many questions which I can't answer... So I called Rajeev sir... Please meet him, he is Sumit and Manisha's science teacher...

**Mr. Sehgal** - Glad to meet you Mr. Rajeev...

**Rajeev Sir** - Pleasure is all mine sir... I have tried to make children aware of the factors responsible for earth's climate including the sun... but how this happens, is still to be discussed...

**Mr. Sehgal** - To understand this, kids go and get pen and paper... you need to note down a few things... which we can refer later...  
First and foremost... do you know that the various factors you have discusses actually interact with each other... they talk to each other... make faces... laugh and cry... argue and enjoy their existence... When all of them laugh together we experience a beautiful lovely climate and when they fight, argue and cry... we experience bad climatic conditions...

**Manisha** - You must be joking sir...

**Mr. Sehgal** -Not at all dear... I am very serious... As Buddha says, everything flows and everything comes back... Similarly, the factor affecting climate run in full circles... hydrosphere i.e. water evaporates from the sea and land adds water vapour to the atmosphere, where condensation occurs turning the vapour into liquid water which then falls as precipitation including snow, hail, rain and dew... If the precipitation falls onto land, it then passes over and under the ground surface eventually to the sea... This water in the form of rain affects the soil i.e. lithosphere...

**Sumit**- Can you get me some soil from your garden in a bowl please...

**Sumit** - Sure sir, I would just get it for you...

(Sumit rushes to the garden and brings soil)

**Sumit** - Here it is sir, hope this much is enough...

**Rajeev sir** - More than enough Sumit...



**Mr. Sehgal** - Now, listen carefully and if you feel like, you can note down a few points for reference...

This soil contains all the factors... This soil has minerals from the lithosphere... there are elements of the hydrosphere present as moisture within the soil... the biosphere is present as insects and plants... and even the atmosphere as pockets of air between soil pieces... The complete system is what makes up life as we know it on Earth...

**Sarla** - Very nice sir, kids hope you understood things better now...

**Rajeev sir** - Also understand that all these factors are very versatile in their composition and function... In case of biosphere only, is composed of all living organisms: plants, animals and one-celled organisms alike...

**Mr. Sehgal** - And most of the planet's terrestrial life is found in a zone that stretches from 3 meters below ground to 30 meters above it... In the oceans and seas, most aquatic life inhabits a zone that stretches from the surface to about 200 meters below...

**Rajeev sir** - But some creatures can live far outside of these ranges... some birds are known to fly as high as 8 kilometers above the earth, while some fish have been found as deep as 8 kilometers beneath the ocean surface... Microorganisms are known to survive well beyond even these ranges... Right Mr. Sehgal...

**Mr. Sehgal** - Absolutely... Can I have a glass of water please ?

**Sarla** - Sure sir, I would get it for you...

**Manisha** - Maa, you sit, I would get it for sir... But please don't discuss anything further... I don't want to miss anything...

**Sarla** - Off course... we would wait for you...

(everyone laughs)

**Manisha** - I have got water for all of us...

(everyone drinks water)

**Manisha** - So where were we ?

**Rajeev sir** - We were here only Manisha... (Smiles) Anyways, we were discussing climate change... In terms of Soil, its degradation i.e. clearing of forest for farmland which itself leads to soil degradation, is therefore an important concern for climate change... Meanwhile, the soil can also be washed away by more frequent rainfall, or dried out by dry weather and eroded by wind... All this leads to increase in earth temperature... which eventually leads to melting of ice i.e. cryosphere, adding to the sea level, much more than what can be evaporated and thus we see floods and tsunamis...

**Sumit** - Oh my god... All these things are so much interrelated...

- Mr. Sehgal** - Yes Sumit... Moreover, this soil erosion destroys plantations, which actually give oxygen, our lifeline, to the atmosphere... It even helps cleaning the atmosphere of the unwanted gases and particles... When there are no plants, the oxygen and carbon dioxide balance gets disturbed, which lead to survival issues for almost all elements of the biosphere...
- Rajeev sir** - The biosphere gets shuffled. Some species shift to other places looking for more suitable conditions in which to live. Body shape and/or size changes for some species. The timetables between species get all mixed up... Many of the species will even go extinct...
- Sarla** - What I understood from the discussion so far is that - Earth's climate system evolves over time under the influence of its own internal dynamics and because of forcings such as volcanic eruptions, solar variations and our own actions as we change the composition of the atmosphere and clear the land for agriculture, urbanisation and industrialisation...  
So, would it be wrong to say that most of the climate change is human induced... I mean, are we not equally responsible for the changes in climate?
- Mr. Sehgal** - Absolutely... No ice is melting on its own, no sea no river is over flooding itself... all this is happening because we are cutting trees for building concrete structures...
- Rajeev Sir** - Yesterday only I was reading somewhere that by 2025, 95% of Bengaluru will be just concrete... Experts debated a host of issues, like The lakes in Bengaluru are dying and the green cover is disappearing due to mushrooming of apartments...
- Mr. Sehgal** - Good example Mr. Rajeev... No air is getting impure on its own, we are disturbing the cycle with our deeds... Climate change is one of the most prominent challenges of our time, with a warming planet being a present-day reality, rather than a potential future threat...
- Sumit** - It means my dream would come true soon ?
- Mr Sehgal** - What dream ? Listen to these facts first... In the past 100 years, the average temperature in India has increased by 1.1°C... Other than in the monsoon season, temperature increase in the remaining three seasons has breached the 1.5°C target set by the Paris Agreement... Recent research shows, India is among the top countries to incur most loss from climate change... The United States, India and Saudi Arabia are the top three counties with the most to lose from climate change...
- Sarla** - Ohhh ! It is really sad...
- Rajeev sir** - No doubt, the conditions are worse than ever... The climate change shows up everywhere – in the atmosphere, hydrosphere, biosphere, cryosphere, lithosphere, asthenosphere, and beyond...  
India is at the top of the list of nations expected to be worst hit by the adverse effects of climate change... But if you understand the facts and improve your daily practices, the factors that we discussed in so much detail can be brought under control...
- Manisha** - Sir, you are trying to say that things can still be managed?

**Mr. Sehgal** - Off course dear child... Always be optimistic... Being an environmentalist, I keep on looking for viable options for our survival... And I am very hopeful that we can give the best of everything we have seen in our life to the coming generations... like you...

**Sumit, Manisha** - Hurray...!!!

**Sarla** - Kids are so happy and relaxed now... I got scared last night the way Sumit dreamt of devastating climate on earth... but now they understand what needs to be done and what not...

**Rajeev sir** - They now know more than their age...

(everyone laughs)

**Mr. Sehgal** - Now I would take your leave young champs... See you soon...

**Sarla** - No, it's lunch time, let's have lunch together...

**Rajeev sir** - Not today Mam... Some other time... I would take your leave now... We would meet soon...

**Sumit, Manisha** - Thank you so much sir... Thank you so much uncle...

(Everyone bids bye)

**Sarla** - Come kids you both have lunch now...

**Sumit, Manisha** - Thank you Maa... Love you...

(Soft music)

**The End**