

## CBSE OPEN TEXT MATERIAL THEME-2

### Environment and Development— Lessons from the Hills

#### **Abstract**

*Man's ability and power to transform his environment through technological developments has undoubtedly enhanced quality of living in many ways. The same power, if applied without rational thinking and understanding the consequences of actions, can also cause incalculable harm to the environment including the man himself.*

*Recent Uttarakhand disaster on 16th and 17th June, 2013 speaks volumes about irrational human actions and unscientific approach in the name of so called development resulting in a great tragedy. The irreversible damage done to the basic components of environment due to cutting down of forests, buildings roads for promoting tourism, unplanned structures, setting up industries and constructing hydroelectric plants etc all contributed to what mankind will never like to see again.*

*The need of the hour is to reflect, examine and understand the natural as well as man-made factors responsible for the misfortune. The present text intends to initiate debate and generate ideas as to what actions need to be taken on the part of individuals, social groups and the government to strike a better balance between economic developments and environmental concerns.*

#### **The Context**

The widespread devastation in the hills of Uttarakhand brought about by cloudbursts and sudden torrential rains

was tragic. Thousands lost their lives, villages were washed away, buildings crashed into rivers and those who survived lost everything they had. Between 16 and 17 June 2013, the hills of Uttarakhand experienced intense rainfall (370 mm within a period of 24 hours) which is exceptionally rare, particularly in this month. The average monthly rainfall in this region for the month of June is 210 mm while in July and August it is more than 600 mm. This happened to be the highest ever single day rainfall in June for the state – the previous highest being 350.5 mm in 1970.

### **Many Reasons**

The horrific disaster that struck Uttarakhand has been assessed as a mix of natural and man-made reasons. Although cloudburst and landslides were the main causes of this disaster, nature alone can't be blamed for this unfortunate turn of events. Man has played an equal, if not greater, role in this disaster. Poor disaster management infrastructure, lousy building constructions, massive deforestation, erroneous agricultural practices on barren hill slopes, unscientific road building and quarrying contributed to make this India's worst flood disaster.

Natural phenomena can sometimes strike very hard and cause disasters if preventive measures are not taken or if some human activities have harmed the natural environment or upset the balance of the ecosystem.

Ecologists point out that the huge expansion of hydro-power projects to meet the growing demands of the expanding state and construction of roads to cope with the lakhs of tourists in Uttarakhand compounded the scale of the disaster. The incessant construction work also resulted in increased surface flow and rise of river bed due to disposal of debris in the rivers. There has been excessive deforestation in these areas to make way for construction in the name of development. The given table is a pointer in this direction.

1 ALMORA HYDEL PROJECTS 1 RIVERBED MINING 59.6 ha FOREST DIVERTED 598.4 ha	2 BAGESHWAR HYDEL PROJECTS 13 RIVERBED MINING 13.87 ha FOREST DIVERTED 478.3 ha	3 CHAMPAWAT HYDEL PROJECTS 2 RIVERBED MINING 182.8 ha FOREST DIVERTED 308.5 ha	4 CHAMOLI HYDEL PROJECTS 51 RIVERBED MINING 115.8 ha FOREST DIVERTED 1,766.7 ha	5 DEHRADUN HYDEL PROJECTS 11 RIVERBED MINING 63.51 ha FOREST DIVERTED 1,203.1 ha	6 HARIDWAR HYDEL PROJECTS 2 RIVERBED MINING FOREST DIVERTED 5,176 ha	7 RAJNITAL HYDEL PROJECTS 4 RIVERBED MINING 123.83 ha FOREST DIVERTED 1,104.7 ha
8 PAURI HYDEL PROJECTS 13 RIVERBED MINING 67.91 ha FOREST DIVERTED 610.7 ha	9 PITHORAGARH HYDEL PROJECTS 62 RIVERBED MINING 34.08 ha FOREST DIVERTED 1,281.6 ha	10 RUDRAPRAYAG HYDEL PROJECTS 19 RIVERBED MINING 51.38 ha FOREST DIVERTED 299 ha	11 TEHRI GARHWAL HYDEL PROJECTS 23 RIVERBED MINING 29.56 ha FOREST DIVERTED 1,522 ha	12 UTTARKASHI HYDEL PROJECTS 42 RIVERBED MINING 141.84 ha FOREST DIVERTED 577.5 ha	13 UDHAM SINGH NAGAR HYDEL PROJECTS 1 RIVERBED MINING 724.69 ha FOREST DIVERTED 145.1 ha	TOTAL HYDEL PROJECTS 244 RIVERBED MINING 1,608.9 ha FOREST DIVERTED 15,072 ha

Source: Down to Earth

One can observe from the data that in order to build 244 hydel power projects, about 14,072 ha of forests have been cleared. The region thus became vulnerable to landslides. Also this displaced a large number of local people for whom the forests were a source of livelihood. There have also been reports to say that a large part of the power that is generated is lost during transmission. This raises a question on the effectiveness of these hydropower projects. A report commissioned by the Union Environment and Forests Ministry in May 2012 had warned the centre against going ahead with 24 hydropower projects planned on the Alaknanda and Bhagirathi river systems in Uttarakhand. It stated that the projects would destroy 22 percent of the state's forestland and affect the unique Himalayan ecology along one-third of lengths of the two main tributaries of Ganga.

It seems that no rules and regulations that were put in place in order to protect ecologically fragile regions in the state have been ever considered. There is no doubt that the region needs economic growth. But this cannot happen at the cost of environment. Data with the Uttarakhand state transport department bears this out. The state has seen a 1000 per cent increase in vehicular traffic in the last eight years, with ecologists having forewarned about the correlation between tourism increase and the higher increase of landslides.

Uttarakhand ranks eighth among all states on the tourism map. This is one of the most fragile regions suffering from poor soil stability. Instead of looking at solutions to this problem, we have seen mushrooming of more and more construction in this area.

According to media reports, when the floods struck, about 28 million tourists were visiting the state, while the local population is close to half that number. It is irresponsible to let such a huge volume of human traffic into an ecologically sensitive area, that too in the monsoon season.



“What else does one expect from the mountain if there is heavy tourist rush at vulnerable areas. The Himalaya is a young mountain and you dynamite it to build roads. Landslides are bound to happen,” says a senior officer of Dehradun Meteorological Centre.

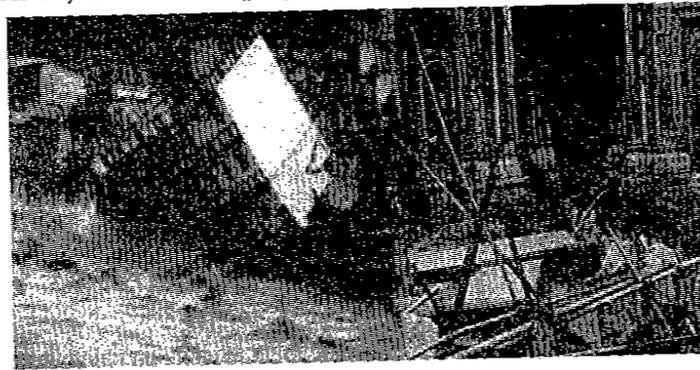
YAMUNOTRI	GANGOTRI	KEDARNATH	BADRINATH
240%	250%	378%	136%
Increase of tourists from 2001 to 2012			
209,753	252,783	323,867	489,924
Pilgrims in 2013 till June 20			

Source: Down to Earth

### Lack of Facilities

There were no warning systems in place, no weathering monitoring systems near the major pilgrimage centres which saw a large number of tourists year after year. There do not seem to be any rain-gauges at Kedarnath and Badrinath and hence one may never know how much rainfall fell at those sites and we will never have full scientific explanation of what happened on June 16-17.

The floods washed away entire villages and small towns and destroyed entire roads, cutting off large areas, as well as homes, hotels and pilgrimage sites.



Much of the infrastructure in the affected areas—roads, bridges, dams and civic facilities —have been completely destroyed or damaged.

Name of the affected districts	No. of villages affected	No. of persons missing	No. of casualties	No. of Houses damaged/washed away	No. of animals died
Rudraprayag	60	10000	The causality due to the disaster is 1056 as report by Govt.	700	Approximately 9500 animals killed
Chamoli	39	2500		130	
Uttarkashi	28	3000		160	
Tehri	15	-		60	
Pithoragarh	10	100		25	
Bageshwar	8	-		-	
Almora	8	-		-	
Deheradun	-	-		1	
	<b>168</b>	<b>15600</b>		<b>1076</b>	

### Human Help

The Army, Air Force, Navy, Indo-Tibetan Border Police (ITBP), Border Security Force, National Disaster Response Force (NDRF), Public Works Department and local administration worked together for quick rescue operations. Several thousand soldiers were deployed for the rescue missions. Activists of political and social organizations were also involved in the rescue and management of relief centres. From 17 June to 30 June 2013, the IAF airlifted a total of 18,424 people - flying a total of 2,137 sorties and dropping/landing a total of 3,36,930 kg of relief material and equipment.



### WHAT NEEDS TO BE DONE

The Administration is planning to enhance the monitoring of ecosystem with a focus on recession of glaciers and their impact on river system in hilly areas. Strict rules are likely to be enforced on the pilgrims and tourists as far as sanitation and garbage disposal is concerned, for promoting the healthy environment at many holy sites scattered all over the Himalayas. People in the region also need to be prepared against potential disaster. There has to be a mandatory environmental impact assessment for the construction of all

state and national roads and expressways of more than a few kilometres in length, including the broadening of existing roads. The most important precaution which needs to be taken is that all hilly roads must have adequate drainage systems to fight with such natural calamities.

Uttarakhand disaster is a wakeup call for every planner and decision maker across the country. It is said that 'those who do not learn from history are doomed to repeat it'. The disaster affected people from all across the country from different parts of the country, who were on a pilgrimage to Uttarakhand.

We can't stop natural phenomena from happening. But we can make them less damaging if we understand better why they happen, and what we can do to prevent or mitigate them. Since people are partly responsible for disasters happening, we have to change what we are doing wrong, in order to avoid or reduce the impact of natural phenomena.

Every community must get to know its own features and surroundings: the natural environment as well as environment built by human beings. This is the only way for a community to manage the hazards that surround it and to reduce its own vulnerability to these hazards.

### **CBSE SAMPLE QUESTIONS AND ANSWERS**

#### **Question 1**

A study by the PHD chamber of commerce and industry suggests that tourism contributed to 30 percent to Uttarakhand's economic growth. Do you think it will be a wise decision to ban tourism to this state? Justify your answer.

#### **Answer Option 1**

Uttarakhand is one of the most beautiful states in our country. This state is rich in bounties of nature and it is a tourist's delight. Tall mountains, pristine water and cool

breeze entice millions of people from all over the world. In fact tourism is one of the most important sources of revenue for this nascent state.

In the wake of the natural disaster which took place in the month of June 2013 due to a cloudburst caused havoc and more than 10,000 people were reported either dead or missing. Though it was a natural calamity, but the effects were magnified manifolds due to continuous human activity on the ground for many years.

Being a tourist magnet, Uttarakhand has built many hotels and guesthouses to accommodate the tourists who visit the state for pilgrimage and leisure. But unfortunately, the building of these hotels violated the environmental policies. The Himalayan ecology is a very fragile system. The continuous growth and upward movement of these mountains is one of the main causes of landslides. It is an earthquake prone zone which can cause further damage. All of these concerns were flayed while making real estate developments in the state. Moreover these projects were supported by the government as well.

As per the reports this state has seen a whopping 1000 percent growth in the tourist traffic since inception. Ecologists are worried as there is a direct relation between inflow of tourists and ecological imbalance. The Himalayan region has poor soil stability, prone to cloudburst and landslides. The recent danger of global warming and climate change is also affecting the soil stability in this region. To construct more and more hotels and buildings, deforestation also happened at an alarming rate. The perils of deforestation are known to everyone.

When flood struck, there were almost 28 million tourists who were visiting the state. It is interesting to note that this region is uninhabitable. Therefore the local population of this area is 50% less than this. During monsoon season the area is wet, landslide prone and risky. At that time if so many tourists were present, one can imagine the magnitude of disaster which can happen.

Unfortunately the worst of fears came true on the fateful day. The aftermath and horror stories are still recounted by the survivors.

It is a tricky decision to take whether to ban tourism completely from this state and affect the livelihood of local people who earn their bread and butter or continue to allow this fashion and turn a blind eye towards the dangers it poses. In my opinion, the government has to devise a middle way for this situation. Practically tourism can't be banned in the state and it will also cast a bleak shadow on the livelihood of other people. Therefore, some steps can be taken by the government agencies which may avert such unpleasant situations in future.

**Regulate the number of tourists.** If sufficient infrastructure for tourists is not available, the number of tourists entering this region should be regulated; especially in risky times such as during rainy season and summer season when the landslides and rain can happen more frequently.

**Weather alert systems should be up to date.** The weather forecasts should be taken seriously. Effective measures should be used to check the minute changes in the climate which can cause serious dangers. It was observed that during the catastrophe in June 2013, many of the regions near Kedarnath did not have basic meteorological equipments such as rain gauge. There is still no record of how much rainfall happened.

**The debris of construction should not be dumped at the banks of rivers.** The debris should be properly disposed. The rains wash off this debris and can cause flooding of rivers easily. These rivers cause extensive damage in the neighbouring areas.

The tourists should be trained to maintain the ecological balance of the region.

Hydropower plants need to be built with proper planning and clearances.

If these steps are taken, such catastrophes can be avoided in the future and precious human lives can be saved.

**Answer Option 2**

It is right that tourism contributed to 30 percent of Uttarakhand's economic growth. This is because there are many tourists visiting the state every year as pilgrims and to visit the Char Dhams—No, I don't think it will be a wise decision to ban tourism. Instead of banning tourism, the government must take care about the improvement of infrastructure and development.

There is poor infrastructures, lousy building constructions, massive deforestation, erroneous agricultural practices on barren hill slopes, unscientific road building and quarrying, and mining on mountains was responsible for the disaster in Uttarakhand. So, instead of banning tourism the government must look upon improving the infrastructure, construction of buildings and prevention of destruction of the natural resources like mountains and rivers.

**Answer Option 3**

From long ago Uttarakhand has been favourite tourist site. A number of holy places like Badrinath, Kedarnath, Gangotri, Yamunotri, Rishikesh, Haridwar, etc. are located in this region. It also has a number of beautiful sites. Along with pilgrims, large number of people also visit Uttarakhand to spend their holidays and enjoy natural beauty. To provide facilities to tourists many roads, hotels, lodges were constructed avoiding basic natural problem of this state like earthquake and cloudburst. In consequent of these construction forests were cut that increased surface flow. Due to disposal of debris from construction sites river became shallow—prone to flood. The increase of pilgrims at main holy places between 2001-2012 are— Yamnotri (240%), Gangotri (250%), Kedarnath (378%), Badrinath (136%). At time of disaster 28 million tourists were present in various sites of Uttarakhand— 2 times the number of local population. Tourism provides one-third revenue to this state. So it will not be wise decision to ban tourism to this state. In spite of that we can take some measures to avoid/reduce damages due to natural disasters which are as follows:

1. To enhance the monitoring of ecosystem with a focus on recession of glaciers and their impact on river system in hilly areas.
2. Strict rules should be enforced for tourists/ pilgrims for sanitation and garbage disposal at tourists/holy sites.
3. There should be a mandatory environmental impact assessment for construction of roads, expressway and buildings.
4. National standard of construction in flood/earthquake prone area should be strictly enforced by the government and private agencies.
5. Local people should also be trained/prepared against potential disaster.
6. Weather monitoring system near major pilgrimage centres should be installed.
7. Limited number of tourists/pilgrims should be permitted to visit pilgrimage centres/tourist sites situated in disaster prone areas.
8. Hilly roads must be provided with adequate drainage system to fight with natural calamities.
9. Growing more trees in deforested areas, road sides, mountain slopes can reduce landsliding.
10. We cannot stop natural disasters but can make them less damaging by understanding their causes and methods to prevent or mitigate them.

**Answer Option 4**

According the study by the PHD chamber of commerce and industry, tourism contributed to 30 percent to Uttarakhand's economic growth. But on the other hand, we know that cutting down of forests and dynamiting the mountains for building the roads and hotels for promoting tourism have been one of the reasons of recent Uttarakhand disaster. Even though it will not be a wise decision to ban tourism to this state. The tourism directly cannot be blamed for such

disasters. If we think seriously, unplanned and unscientific constructions without understanding the consequences have been the main reasons of this natural disaster. If the constructions in the name of tourism are done with rational thinking and taking into account their consequences, such incidents can be prevented.

Tourism industry play an important role in the economic growth of Uttarakhand and is necessary for the development of state. Most of the tourists visiting the Uttarakhand are Hindu pilgrims. So banning the tourism to this state will also hurt the religious sentiment of a large section of Hindu community. Hence it will not be a wise decision to ban tourism to Uttarakhand.

### Question 2

The Uttarakhand region's key resource is the water that flows from high glaciers and mountains to the plains. This resource was utilised to build hydropower projects that generate revenue for the state. How do you think this can be utilised as an opportunity without being a threat to the ecology of the state?

### Answer Option 1

The Himalayan Rivers are supplied with water throughout the year by melting of snow and glaciers in the mountains. Since the region is a hilly area, the rivers flow with great natural force and plenty of waterfalls are present in these regions. This serves as a natural gift to humans who can harness this to produce hydroelectricity. Since hydroelectricity does not causes water pollution, they are preferred way of satisfying the energy demands of the state. Moreover the natural landscape allows making small projects with investing much in construction. Therefore, these projects were build without taking their effect on the region in account.

After the inception of the state a staggering 244 hydel power plants have been sanctioned in this region. As we know that progress doesn't come cheap. For these projects 14,072

hectares of forests have been cleared. The soil lies bare which is vulnerable to erosion due to water and air. This causes massive landslides. Moreover, to build these projects heavy machinery has been plying on these weak roads. This further loosens the soil and it cannot withstand even a slightest force of water or shaking of earth. The deforestation has also displaced many poor people who were dependent on the forests for their livelihoods.

The result from these power stations is far from satisfactory. After destroying the ecosystem of this region it is reported that a huge amount of electricity is lost in transmission. It never makes to the homes of the people who need it. Therefore, the effectiveness of these projects came under question. The Union environment and forests ministry has warned the Uttarakhand government against the proposed sanction of further development of other 24 projects in these regions as they pose irreversible threat to the region and lives. These projects will change the course of Alaknanda and Bhagirathi rivers. Their effect will be felt even in the plains and the river Ganga can change its course.

The major challenge is to utilize this opportunity to satisfy the energy needs of the state without damaging the ecosystem of this region.

Before starting a hydro power project in the area, proper planning should be done. An extensive study should be done to estimate the effect of constructing such projects in the long run.

The debris of construction should be disposed off carefully and should never be dumped next to a river. In case of rains, these flow to rivers and raise the water level which causes flooding.

The environmental warnings and concerns should never be ignored. Using of explosives, cutting of trees and changing the course of rivers always have short term and long term effects on the ecology of the area. These should be estimated and after addressing these concerns only then the project should be started.

Proper clearances should be enforced even on smaller hydro-power projects. Though small, their effect cannot be ignored in the long run.

### **Answer Option 2**

The Uttarakhand region's key resource is the water that flows from high glaciers and mountains to the plains. This resource was utilised to build hydropower projects that generate revenue for the state.

This can be utilised as an opportunity without being a threat to the ecology of the state. There should be planned construction of hydel power stations. The disaster occurred due to unplanned and incessant construction work which led to envisaged surface flow and rise river bed due to disposal of debris in the river. There was also extensive deforestation which made the region vulnerable to landslides. Thus, if there is planned construction and deforestation is reduced the state would have no harm. If the rules and regulation that were put in place in order to protect the ecologically fragile regions in the state have been ever considered, there is no doubt that the state needs economic growth so if there is planned and proper development in the state then it would be an opportunity for the state to grow. If the planned hydel power stations are constructed then the state can grow economically.

The construction of bigger hydel power stations can prevent destruction of natural resource and deforestation and creating ecological imbalance. The construction of hydel power stations leads to development of state and its economy.

### **Answer Option 3**

Presently there are 244 power projects in Uttarakhand. These were installed after clearing 15072 ha of forested area, hence making them prone to landslide. Government has planned to install 24 hydel power projects on Bhagirathi and Alakananda-tributerries of Ganga. Because Uttarakhand is suitable place for construction of hydel power projects, so government wants to make it a source of revenue by selling

electricity to neighbouring states. A largest part of power produced by the power plants is lost during transmission. This raises questions on effectiveness of these power plants. In May 2012, a report of Union Environment and Forest Ministry warned the centre against construction of 24 hydel power plants on Alaknanda and Bhagirathi because it would cost 22 per cent of states forest land and affect Himalayan-ecology adversely. The construction of hydel power projects involve blasting of hillsides, excavation, debris dumping, movement of heavy machinery and diversion of forest and river. Uttarakhand is a earthquake-prone state. Any damage to hydel power projects by earthquake would create flood like situations in many areas. Some measurements to utilize hydel power capacity of Uttarakhand without affecting its ecology adversely are as follows:

1. Minimum forest cover should be cleared for the construction of hydel power project.
2. Hydel power plant should be so strong that it can bear earthquake more than 6 Richter scale. The walls of dam can store a large amount of water in rainy season.
3. Minimum migration of local people should occur during construction of dam for hydel power projects. Biodiversity and monuments of that area should be protected.
4. Debris produced during power project construction should not be disposed into the river which result in silting of river bed.
5. The safety standards in which public can have full confidence against risk should be enforced strictly.
6. Loss of electricity during transmission should be checked.
7. Proper inspection, surveillance, operation and maintenance of the dam is must to ensure safe functioning of the dams.
8. Small hydropower projects should be promoted because they have little water storage and less chances of flood risk.

9. A cumulative study should be done by the government to assess the impact of hydropower plants on Himalayan rivers and mountains.
10. Hydropower is seen as important source of energy in India. It makes up only 17.6% of the nation's installed power generation. Uttarakhand in comparison to other Hilly states can play leading role in hydropower development.

#### **Answer Option 4**

More than 300 million people in India are still without access to electricity. Hydropower is seen as an important source of energy to meet India's mounting energy needs, and water flowing from high glacier and mountains in Uttarakhand is most suitable for this purpose. But it has been observed that hydropower projects in Uttarakhand have been the threat to the ecology of the state. One can observe from the given data that in order to build 244 hydel power projects about 14,072 ha of forests have been cleared. The region thus became vulnerable to landslide and also a large number of people were displaced.

But these problems can be tackled by proper planning and taking into account the consequences of installation of such projects. The water resource in Uttarakhand can be utilised as an opportunity without being a threat to the ecology, by taking account of following points:

1. Environment degradation caused by such projects should be studied properly.
2. Adverse effects of projects should be taken into account and a road map should be prepared to counter such effects.
3. Dams should be strong and safe, *i.e.*, dam safety and security should be ensured.
4. During the construction debris should be handled properly. It should not be dumped into river.
5. Projects should be designed in such a way that cause less harm to environment.
6. Instead of big dams, smaller ones should be built.

**MORE SAMPLE QUESTIONS AND  
ANSWERS FOR PRACTICE****Question 1**

Human beings have the ability to change their environment to make their lives better. Do you think that this unique quality of human endeavor is the root cause of Uttarakhand disaster?

**Answer Option 1**

Humans have the unique ability to transform their natural surroundings. This ability has been the prime reason of development. Since the days of prehistoric times, human beings had the ability to think about their problems and devise unique ways to overcome them. They made tools to become good hunters. They rubbed stones to produce fire and harnessed its power. Gradually humans made many technological advances. They made axes to cut trees and use land for agricultural and other purposes. As time advanced, technological advancement happened at a faster pace. Even we as humans were marveled at our journey from Stone Age people to highly technical and intelligent beings.

But as humans advanced, their respect and regards for their environment and nature diminished. They believed that nature is only meant for exploiting and taking advantage. It was also believed that nature is mute and cannot express its response. This prompted mankind to make advances without using their rationale or ignoring signs of warning.

As a result of this human misdemeanor tragedy struck recently in Uttarakhand and caused unforeseen damage of lives and landscape. Cutting trees, using dynamites to blow hills and land, constructing illegal and unplanned structures, changing the course of rivers and blocking them, building roads, allowing millions of tourists in an ecologically fragile zone, setting up industries and releasing their effluents in air, water and soil without properly treating them, constructing hydroelectric plants, excavating and quarrying

have damaged the environment of the region. It is important to mention that the Himalayan mountains are continuously growing. Therefore, the soil is loose and prone to landslides. Moreover the climatic conditions are highly volatile and incidents like cloudbursts can happen in no time.

In the context of tragedy in Uttarakhand, the ability to transform surrounding without using common sense, and proper concern is the root cause of the disaster.

We have to remember that the earth has enough for our needs but not for our greed. In the quest for making our lives better we humans have caused such damage to our environment that it cannot sustain our lives. This calls for using our better judgement and forces us to stop and think about our mad rush for progress. Development without rationale and concern is the chief cause of damage to our environment.

#### **Answer Option 2**

The true causes of the tragedy in Uttarakhand were—

- The region's ecology by the extensive growth of tourism,
- Unchecked proliferation of roads, hotels, shops and multistory housing in ecologically fragile areas,
- Mushrooming hydroelectricity dams that disrupt water balances.

These man-made factors turned an extreme weather event into a social catastrophe. Cloudbursts, floods and rapid swelling of fast-flowing rivers aren't uncommon. But this time the floodwaters, laden with tens of thousands of tones of silt, boulders and debris from dam construction, found no outlet. The routes they took in the past, including ravines and streams, were blocked with sand and rocks. The waters inundated scores of towns and villages, submerging some buildings under several feet of mud, smothering life.

Indiscriminate building of hydroelectric dams was the worst culprit. These involve drilling huge tunnels in the hills by blasting rocks, placing enormous turbines in the tunnels,

destroying soil-binding vegetation to build water channels and other infrastructure, laying transmission lines and carelessly dumping excavated muck. Many dams have been built on the same river so close to one another that they leave no scope for its regeneration. Dams steal water from local people. They alter the hydrological cycle and natural course of rivers. Uttarakhand's 70 completed large dams have diverted more than 640km, equivalent to half the length of its major rivers. They have profoundly destabilized its ecology.

The explosive bursting of glacier lakes, are thought to be a consequence of human-induced climate change, which is causing rapid melting of glaciers in the Himalayas, themselves warming at twice the global rate.

Disaster Management Authority, formed in October 2007, has never met or formulated "rules, regulations, policies or guidelines". Modestly priced radar-based technology to forecast cloudbursts would have saved lives. But it wasn't installed. Nor were emergency evacuation plans drawn up.

There was local-level governance failure, too. Unregulated construction of roads and bridges was allowed on crumbling, landslide-prone ridges and steep slopes, ignoring the region's fragile geology and high earthquake vulnerability.

Forests were destroyed on a large scale. Hundreds of buildings were constructed in the flood plains of rivers, their "natural" terrain, which should be no-go areas. Riverbeds were recklessly mined for sand. As construction debris accumulated, land contours and flows of streams and rivers changed.

### **Question 2**

A natural phenomenon may prove to be a disaster due to human activities. Discuss your answer in context of Uttarakhand tragedy.

### **Answer Option 1**

The disaster in Uttarakhand though was natural in origin but the effect was manmade.

In case of Uttarakhand, the natural event was a cloudburst. But the conditions on the ground magnified its impact and caused unforeseen damage of life. Some of the important reasons are:

**Urban development:** Recently in Himalayan areas there has been a spurge of hotels and urban dwellings to cater to the needs of tourists. For this, trees are being cut exposing the loose soil. Moreover use of heavy machinery and bulldozers cut through the land which makes them weak and more prone to landslides on a slightest pretext of rain. The incident of cloudburst caused havoc and extreme landslide.

**Hydropower projects:** To cater to the energy demands of a developing country, a number of hydropower projects have been sanctioned. These projects are planned on the course of many Himalayan rivers. For these projects, the river courses need to be shifted and tunnels have to be cut through them. The debris generated are not properly disposed and they are simply dumped on the sides of rivers. In case of heavy rains, this debris washes off in the rivers. This raises the level of the river and it immediately floods on its banks.

**Deforestation:** Deforestation has been the mother of all these evils. Due to deforestation the soil is left loose. It gets washed away easily due to rains. It causes landslides which cause damage to lives and property.

Unscientific mining has caused the rivers to increase their width and change course. As per rules, not more than 0.9 metres should be dug but mining companies dig more than 9 metres. According to Y.P. Sundriyal, Professor of Geology at Hemvati Nandan Bahuguna Garhwal University in Srinagar, during monsoons when the river swells, it naturally moves towards the dug up area. As a result the river changes its course and washes away everything which comes in its way.

### Answer Option 2

The disaster in Uttarakhand was a natural disaster. It was due to a natural phenomenon of cloudburst. But the

environmental conditions on the ground magnified its impact and caused this damage. Some of the reasons are—

1. The construction of resorts and hotels near the river bank.
2. Setting up of unplanned hydroelectric power plants.
3. Cutting down forests for human needs.
4. Cutting down Himalayas for its wealth of pebbles, boulder and gravel.
5. Unscientific mining has caused rivers to increase their width and changed their course.

### Question 3

To allow millions of tourist in a fragile area of Himalayas was inviting a tragedy to happen. Do you think pilgrims were the main reason of disaster in Uttarakhand?

### Answer Option 1

The Himalayan region is abode to many important pilgrimage places. Therefore, every year hordes of tourists and pilgrims move to these places to get a glimpse of their deities. To provide amenities for these pilgrims many guesthouses, resorts and hotels offer their services. The sad part is that most of these facilities do not care about the environmental norms. They are built by cutting open the mountains and growing their business. In case of a disaster like flood or earthquake, these hotels, being not strongly based, fall like a pack of cards. This causes further damage of life.

Therefore, government should limit the number of pilgrims going for these areas. Only the required number of pilgrims should be allowed who can be taken care of by the facilities existing in those areas without damaging the natural ecosystem.

Though the pilgrims did not cause anything to incite the tragedy but the presence of 28 million pilgrims in a weak and fragile zone was certainly dangerous. The mountains could not withstand the force of water and thus didn't stand long and got washed away.

**Answer Option 2**

The Himalayas are abode to many important pilgrimage place where every year millions of tourists and pilgrims come to get a glimpse of their deities. To provide comfort for these pilgrims and tourists various resorts, hotels and other comforts are made there. These constructions are not strong and consequences of these illegal and unplanned constructions are not taken into account. To make the road mountains are dynamited and trees are cut which lead landslides and flood.

The presence of 28 million pilgrims in a weak and fragile zone was dangerous. Thus, the mountains could not withstand the force of water and thus didn't stood long and got washed away.

**Question 4**

Mushrooming of hydropower plants has done more harm than good in the Uttarakhand region. What mistakes did the government make in these projects?

**Answer Option 1**

Himalayas are an ecologically fragile zone. It means that areas of Himalayas are constantly being shaped by natural forces and they are in a state of transition. Therefore, development activities to harness the bounties of nature have to be done with careful planning otherwise the recent disasters will become a common scene.

One of such case is developing hydropower plants in this region. The website of Uttarakhand Jal Vidyut Nigam shows that there are 45 hydropower plants which are operational in the state. The state plans to build 199 more such projects. It is estimated that after construction, these projects will affect around 81% of Bhagirathi and 65% of Alaknanda rivers. This will leave a huge stretch of river dry and will change their natural course. These projects do not even leave 3-5 kms between any two projects. It is also reported that since these

projects do not require environmental impact assessment, they are not taking in consideration of the effects each dam will have on their surroundings.

Moreover dam construction requires blasting, excavation, debris dumping and movement of heavy machinery. All of this affects the Himalayan region in a negative way.

Therefore, the hydropower projects should be constructed after indepth study, careful planning and calculating its effect. Moreover it also needs to be discussed whether we should construct numerous small hydropower projects or have one or two major projects. Smaller projects are sanctioned without considering its implications on the environment which proved harmful in the long run.

### Answer Option 2

The development of hydropower plant is an activity that should be done with careful planning to prevent disasters. The website of Uttarakhand Jal Vidyut Nigam shows that there are 45 hydropower plants which are operational in the state. The state is planning to build 199 more such projects. It is estimated that after construction, these projects will affect around 81% of Bhagirathi and 65% of Alaknanda river. This will leave a huge stretch of river dry and change their course.

The mistakes that were made by government in these projects were—

1. The hydropower projects should have been constructed after proper planning and its indepth study.
2. Instead of smaller projects, there should be a bigger and planned project. Smaller projects are sanctioned easily but they are proving harmful in the long run.

### Question 5

What lessons should the governments draw from the recent tragedy in Uttarakhand?

**Answer Option 1**

In the wake of the disaster in Uttarakhand, the governments should take some concrete steps to be prepared in case of natural disasters. We need to understand that every landscape is different from others. If they pose some opportunities then they also have certain limitations. Progress and development cannot happen at the expense of environment.

Disaster management systems should be up to date. The communication system should be strong and help should be dispatched immediately.

The weather monitoring systems should be accurate. It was heartening to know that many places in Kedarnath did not even have basic rain gauge equipments. The weather and climate warnings should be carefully heeded. Moreover a thorough study on changing weather patterns should be made so that disaster preparations can be done beforehand.

Developmental activities should be restrained in ecologically sensitive zones such as in Himalayas or in other regions of the country. Blasting, digging, quarrying, mining etc should be done with restraint and proper planning. Before making houses in these zones, the builders need to thoroughly study the geographical limitations of these areas and use traditional knowledge and prepare houses and dwellings with the materials which can withstand the climate of these regions. Such as in earthquake prone regions houses are made with wood and light weight materials instead of using concrete.

Hydropower plants should be operated and sanctioned after thorough research and study. Development is important but putting the lives of other people at risk is not advisable.

The number of tourists should be regulated in such zones. Those tourists who enter these areas should be trained for any disaster.

**Answer Option 2**

Taking the lesson from recent tragedy in Uttarakhand government should take some concrete steps to counter

such disasters in future. Government needs to review where it failed to tackle such a hazardous situation. Both the government and public should understand the consequences of destruction of ecology in name of so called development. We need development and progress, but it should not be on the cost of environment.

We have to learn to keep the followings things in mind to prevent such disasters to happen in future---

- Disaster management should be up to date. The weather monitoring system should be accurate.
- Developmental activities should be restrained in ecologically sensitive zones.
- The number of tourists should be regulated in such places and they should be trained for any disaster.
- Hydropower plants should be operated and sanctioned after thorough research and study.

