

TEST-7 (Batch-I)

SCIENCE AND TECH + ENVIRONMENT DIASATER MANAGEMENT

MODEL ANSWERS

1. Over the counter sale of antibiotics and their rampant uses are contributing to delayed diagnosis and drug resistance. e.g. X.D.R. T.B. Discuss the question involved with reference to India health's Sector ?

Ans. It is important to take medicines correctly. Taking OTC has risks as some of them interact with other medicines as well as cause suppression of symptoms only leading to delayed diagnosis or making disease chronic.

Keeping into socio-economic situations of developing countries e.g. India, due to lack of health care facilities people mostly with ruined background and lower income are dependent upon quacks and OTC drugs.

As India contributes around 15% of total MDR/XDR T.B. which is caused due to OTC and symptomatic treatment leading to delayed diagnosis and making disease drug resistant.

- As a patient with normal T.B. if doesn't take full course of medication it leads to T.B. resistant to first line of drugs i.e. M.D.R. T.B.
- If the MDR T.B is further treated without adherence to full drug doses and course it makes it resistant to second line of drugs also called XDR T.B.

In order to control this situation Govt. of India through initiatives like RNCTP and DOTS+. providing bedaquiline as a treatment to XDR T.B.

IT enabled services are playing a great role to track patient's health and to ensure proper medication.

Rural medicine initiative and provision of DOTS+ centers at P.H.C are good initiatives to enjoy the demographic dividend with healthy work force.

2. In vitro fertilization technology emerged as panacea to the childless couples, critically analyze its socio economic effects in the light of Surrogacy Regulation bill 2016, whether law is able to address the aspirations of Indian society

Ans. In-vitro fertilization used to provide child to childless couples through three forms viz. sperm donation, and surrogate mother has emerged as a boon to such couples.

But after legalisation of surrogacy in India it become a hub of commercial surrogacy on surrogacy related tourism. After the case of Baby Manji Yamada vs Union of India raised various ethical questions regarding surrogacy as.

- Easy abandonment of children.
- The exploitation of women who compelled to be surrogate due to social, economic compulsion.
- Nationality of child and post delivery care of surrogate mother.

In order to strike a balance between needs of childless couples and socio-economic and ethical issues involved, Govt. of India (Union Cabinet) proposed surrogacy regulation bill 2016.

It provides for.

- Surrogate facility to
 - (a) Childless hetero sexual couples married for at least 5 years.
 - (b) Either of partners must have proven in futility.

- Age 23-50 for female in 26-55 for male.
- The couple should employ an altruistic relative and a woman can be surrogate only once in life time.
- Egg donation is banned.

The bill is extremely necessary in certain places like Gujarat where baby farms exist and women are exploited by middle man and being paid only 25% of actual payment

Although India has not banned surrogacy completely but provision of altruistic surrogate is a problem to find a surrogate mother, while homophobia, discrimination toward hetero normative relationships and paternalistic enforcement of cultural norms are a bone of contention.

So bill should be amended to make regulation facilitative rather than resistive to address the aspiration of dynamic India society

3. Non communicable diseases (NCD) in present scenario are biggest factor to global burden of diseases. Discuss the challenges and issues involved?

Ans. The 2030 agenda for sustainable development goal adopted at the U.N. summit on sustainable development in September 2015 recognized NCD as a Major challenge for sustainable development which were not addressed under MDG.

As India is under demographic transition phase i.e. rapid urbanization and skill based service sector oriented economy, the NCD which are basically related to life style leading to be a big challenge for psycho-physiological well being of skilled/unskilled rural work force.

In order to take the demographic dividend and to achieve double digit growth quantum, NCD has to be addressed.

As a part of agenda of MDG head of states including India committed to develop national responses to solve this growing health menace through following policies.

- To reduce pre mature death through NCD e.g. heart disease, cancer etc by 33%.
- Strengthen responses to reduce the harmful use of alcohol.
- To achieve universal health coverage.
- Strengthening the implementation of WHO framework convention on tobacco control (FCTC)
- Support the research and development of vaccines and medicines for NCD's that primarily affect the developing countries.
- Provide access to affordable medicines & vaccines for NCD's

So Govt. initiatives like promotion of yoga now mental health policy, smart city mission etc. are proving to be a great step toward controlling NCD's.

4. Non lethal weapons e.g. pallet guns are emerging as a new tool for controlling law and order situation. Write the positive and negatives aspects of such technologies?

Ans. Non lethal weapons which doesn't cause death are the new tool in the hands of Law enforcement agencies e.g. central police forces, paramilitary forces etc. used for crowd control e.g. tear gas pellet guns, SKUNK employed by Israeli forces (made up of yeast & protein) Nontoxic water canons, rubber bullets beanbag rounds etc.

The positive aspects of such weapons are

- They could be used by maintaining a safe distance from crowd so avoids causality in paramilitary forces.

- It doesn't cause death only bruises on light shock.
- It helps to disperse the unruly most effectively.

The negative aspects of such weapons

- Though they don't cause death but causes significant pain and resulting hematomas.
- Pullet gums are being held responsible loss of eye sight in J & K.
- Such weapon may cause disability.

So the defense research organization e.g. DRDO are developing new alternatives to make them less harmful and more effective e.g. PAVA cells (pelargonic Acid Vanillyl Amide) an organic composed found in chilli pepper which is nontoxic and could temporarily paralyze, stun & immobilize the target.

As protest is a necessary ingredient of democracy so such options to be discovered to make them safer as well as always to be used at the last resort of crowd control by security agencies.

5. Zika virus is emerging as a new challenge to India, elucidate the problem and its impact on India given its unique socio-economic conditions.

Ans. Zika virus is an emerging mosquito borne viral disease transmitted by the bite of an infected Aedes mosquito.

It has created a panic over thousands birth defects in Latin American countries. In may 2015 public health authorities of Brazil confirmed the transmission of Zika Virus in north east of the country along with Zika Virus infection, cluster of microcephally (conditions where a baby is born with a small head and the head stops growing after birth) cases and other neurological diseases/disorders (Guillain-Barre syndrome) reported in Brazil.

These situations created big questions before the countries over the participation in Brazil (Rio) Olympics. Except a few countries, all the countries of world participated in Rio Olympics along with following health advisory and prophylactic measures.

Recently, reporting Zika virus in India citizens in Singapore, created a situation of uneasiness in India.

As having a high population density, lack of proper sanitation and health care system may cause havoc or epidemic situation in India.

And situation could have been further fueled due to self medication and decayed detection of viral infection.

In spite of all challenges India has been able to prevent these diseases by notifying travel related guidelines to Indian tourists travelling to affected countries.

Screening of persons at airports coming from affected countries with symptoms, special treatment and health care facilities in major hospitals and creating public awareness.

6. Genetically Modified Mustard is claimed to a solution for India's oil sector scarcity. Discuss its positive and negative aspects.

GM mustard has the potential to become the first GM food crop in India (disregarding BT Brinjal and Cotton). Researched and developed for almost a decade by the Delhi University scientists, is in the midst of controversies for the MoEFCC's cautious and confidentiality in reviewing it. GEAC (Genetic Engineering Appraisal Committee) of MoEFCC has recently released "Assessment of Food and Environment Safety" for public comments.

Perspective of developers of crop

1. Mustard, a self-pollinating crop is hard to hybridise using cross pollination. So, they cross pollinated GM versions of Indian and European versions were used to develop DMH 11 Hybrid.
2. Since, it's a hybrid, it's yield is higher. About 30% more.

3. Will augment the oil needs of the country and reduce edible oil imports.
4. Resistant to Glufosinate herbicide. A blanket of Glufosinate can kill all the other weeds, instead of manual de weeding.

Perspective of Government/ Supreme Court

1. Not necessary in India, as it will displace jobs of several manual de-weeders, which is their livelihood.
2. Increase asymmetric demand for HT (Herbicide Tolerant) version of mustard.
3. 30% extra yield is an outdated number. The newly released hybrids yield equally more.

Perspective of Consumers

1. Consumers are particular unhappy from the mystery around the confidentiality, evident from the govt. non-compliance to a CIC order to release data.
2. Ministry is reducing public participation, and limiting them only to comments at the last stage. Denying proper voice from the actual stakeholders.

Hopefully, BT mustard will not suffer the same fate BT brinjal has suffered. India with its large and ever growing population needs every possible technology to achieve high yields, to progress and compete with global economies.

7. Fat tax is emerging as innovative strategy to deal with various health problems of urban world. Discuss critically the policy and its implications.

Kerala - first state in India to introduce a “fat tax” on certain calorie-rich food (burgers, pizzas, etc) served in branded restaurants. This is more of PREVENTIVE MEASURE as Kerala’s food habits are changing dramatically. Kerala has second largest obesity population after Punjab, according to national family health survey. With increasing affluence, lifestyle diseases are on the rise & the government aims to check this with the fat tax.

Levying a tax on calorie rich, unessential food items has been the preferred route to rein in the consumption of unhealthy products in some developed countries also like in Hungary, France, Mexico taxes. Even WHO had urged governments to use fiscal methods to curb obesity. But “FAT TAX” policy levied in Kerala has both positives & some negatives that we must take into consideration.

POSITIVES

1. Social Cost - A fat tax would make people pay social cost of unhealthy food.
2. Encourage Healthier Diet - A tax on unhealthy foods would encourage people to some extent to choose healthier foods. As well as encourage producers to supply food lower in fat and sugar to lower the cost.
3. Raise Revenue - Though increasing tax on fatty foods, the government could raise substantial amount of money. They could use this revenue for state development.
4. Reducing Obesity - The ultimate objective of fat tax policy is to reduce obesity among people and reduce risk of diseases related to obesity like heart diseases, diabetes, strokes etc.

NEGATIVES

1. Criteria For Tax - Criteria for deciding tax on wide range of unhealthy food is missing. If we ignore a wide variety of high calorie food and focus on a few then this policy is not beneficial as in the case of Kerala which impose fat tax only on some food items
2. Likely To Be Regressive - Tax burden on low income group only, because high income group can easily pay additional amount of tax.

3. More Factors Responsible For Obesity - We cannot ignore other factors that caused obesity such as size of portions, levels of exercise and genetic reasons.
4. Administration Costs - Collecting taxes from unhealthy foods have a lot of administrative costs attached to it. As well many companies may oppose this tax and can challenge government in courts.

But if state is serious about reining in consumption of unhealthy foods, it should adopt SEVERAL MEASURES like -

1. Set a threshold limit for fat & calorie, and tax all food items above this limit.
2. Bringing sweetened drinks, refined products, packaged food containing high amount of salt & trans-fatty acids under taxable product list.
3. Taxing bad food along with cross-subsidies of healthy and wholegrain food will make more impact.
4. Also a fat tax could be equity neutral. Some may say a fat tax is regressive (takes a higher % of income from low income families), but if other regressive taxes are reduced the overall impact should be unchanged. Fat Tax is a good measure to curb unhealthy food consumption but government must take a holistic approach in making a effective policy and bringing a real change in food consumption pattern.

8. Govt. of India recently banned Fixed Drug Combination (FDC) sales. Discuss she merits and demerits of this policy initiative.

Ans. Fixed dose combinations (FDCs) refer to pharmaceutical **preparations containing 2 or more drugs in a fixed ratio**. They were conceptualized on the idea that certain drugs potentiate the action of other drugs when given together.

That said, FDCs have to be very rationally and carefully prescribed, because-

1. Patient may not actually need those many drugs, thus he is subjected to additional side effects.
2. Some drug doses have to be individualised based on patient's response. You cannot do that if you're using FDCs.
3. Some companies have been selling FDCs in India under this pretext without consulting the central government, like the cefixime-azithromycin combination, which has already been banned in the UK.
4. These non-essential FDCs thus do more harm than good by encouraging irrational and indiscriminate prescribing of more drugs than needed.

What will happen if you use more drugs than needed?

In evolutionary terms, the drugs you give will kill the susceptible bacteria leading to selection of those strains which are resistant to the drug. When the drug resistant strains attack, the same drug will never work. Now because you have given an FDC, other drugs in that FDC will not work as well. This is very dangerous because we have limited types of antibiotics against any particular species of microbes.

In an effort to stop this, the government has banned FDCs that comprise of drugs which are not significantly more efficacious when given as FDCs than when they are when given as monotherapy.

Short term, it will be a major setback for pharma companies, like it has been to Pfizer India because the Corex cough syrup got banned. People used to self-medicating using FDCs as well as physicians reliant on prescribing these will have to look for alternatives.

But in long term, it will-

1. Encourage rational prescribing of only the necessary drugs in adequate doses
2. Discourage self-medication of antibiotics by the people.
3. Help battle the epidemic of antibiotic resistance plaguing India

9. UAVs are emerging as a new tool of multipurpose utility. Discuss merits and demerits of their use in the light of draft guidelines of UAVs..

Ans. Draft guidelines upon UAV

The DGCA (Director General of civil aviation) has recently issued draft guidelines for UAV's

According to proposal the aviation regulator will issue operation permit and unique identification numbers (UIN). So air Traffic controllers can check and trace and Identify any drone at 200 ft on more height.

The UIN could be issued to

1. The only citizen of India
2. The company/corporate body registered to India that has a majority of stake holders which are Indians.
3. UAV operating more than 200 ft height will need DGCA permit
- UAV under 2 kg will fall under micro greater then 2 kg and less than 20 kg under mini 20-150- kg under small 150+ in large category

Merits of UAV's under the light of Draft guidelines.

1. Save lives :- Reduce military personal in combat as in recent surgical strikes.
2. Lower cost as economical in purchase, fuel & maintenance.
3. Lower risk as could fly lower in height, suitable for intelligence garnering and less risk to military hardware.
4. Could be use in disaster Management, crowd control, traffic control etc. under the aegis of draft guidelines. It will stream line their use and with UIN no. will help to insure Internal security.

Disadvantage/Demerits

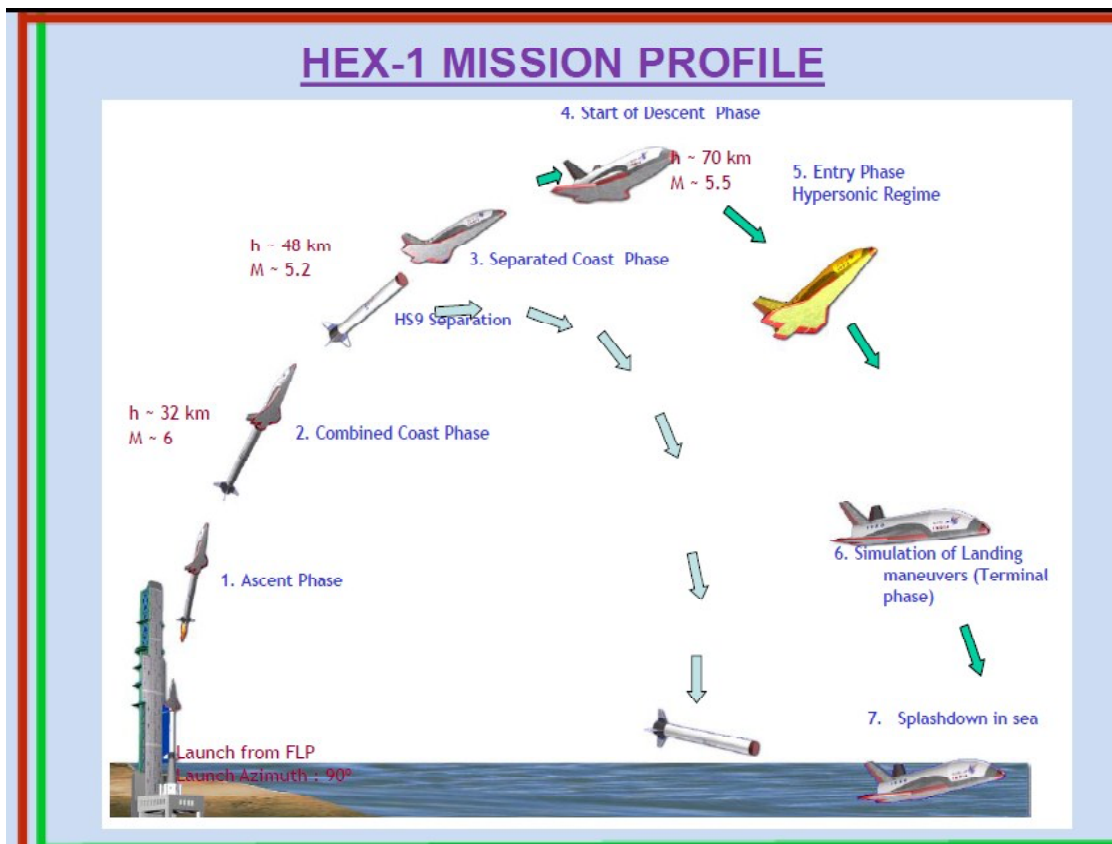
1. Limited ability: - As can't capture surrendering military personnel
2. Making warfare easier by diminishing ethical decisions.
3. Breach in private life as could be used as a snooping device.
4. This extreme control guide line may affect nascent drone industry of India.

10. Reusable Launch Vehicle is a new feather in the cap of ISRO. Discuss its utility for Indian space programme.

A Reusable Launch Vehicle (RLV) is the space analog of an aircraft.

Ideally it takes off vertically on the back of an expendable rocket and then glides back down like an aircraft. During landing phase, an RLV can either land on a runway or perform a splashdown. Small wings provide maneuverability support during landing.

The main advantage of an RLV is it can be used multiple times, hopefully with low servicing costs. The expendable rocket that is used for launching the RLV can also be designed to be used multiple times. A successful RLV would surely cut down mission costs and make space travel more accessible.



ISRO's RLV Technology Demonstration Programme (RLV-TD) is a plane-like reusable vehicle launched by an expendable single state solid booster. The mission will end with a splashdown in the Indian Ocean.

The rocket launcher will help it to reach Mach 6, and an altitude of 100 km. After reaching the required height it will undergo the re-entry phase, glide down and finally splash down in the Bay of Bengal. The vehicle will spend nearly 5 minutes in its coast phase at the maximum altitude before doing re-entry.

The RLV will undergo a series of experiments:

- 1. Hypersonic Flight Experiment (HEX):** The first experiment is the launch itself. The RLV will be launched by a solid booster rocket and then released. The booster rocket will fall back into the sea, while the lofted RLV will re-enter the atmosphere independently and be guided to a controlled splashdown. This is the test planned in March.
- 2. Landing Experiment (LEX):** The second experiment will test the RLV's turbofan engine. The RLV-TD will be launched as in HEX, re-enter the atmosphere at hypersonic speed and use aerodynamic braking to decelerate. It will then perform a 2g turn towards its launch site, and it will start its turbofan engine upon reaching Mach 0.8. It will then cruise back to its launch site at Mach 0.6 and land horizontally on a runway.
- 3. Return Flight Experiment (REX):** The third experiment, the RLV-TD will be launched to orbit and then de-orbited for a landing on a runway.
- 4. Scramjet Propulsion Experiment (SPEX):** The final experiment will test the performances of an RLV-TD fitted with an air breathing scram jet engine.

Impact of RLV test on Indian Space Program

- The RLV-TD Program is not just a technology demonstration for India, but a way to prove how much it has progressed in the field of space exploration.
- The test is a part of a larger plan to build a fully functional two stage to orbit (TSTO) vehicle.

Currently the annual spending budget of IRO for launching satellites is Rs. 300crore. A successful RLV program would reduce the cost of space missions, making India more competitive in the launcher market. For now, the test program will expand the technological capabilities of India, enabling it to be a forerunner in space exploration in near future.

Looking at the Future

The success of the Mars Orbiter Mission at the first attempt has boosted the hopes of ISRO to send humans to Mars. A highly developed version of RLV for launching humans to space could demonstrate the technological ability and progress achieved by Indians in the field of space exploration. The series of experiments that need to be carried out will help in expansion of space technology and capability of ISRO and India culminating in a fully developed version of RLV used as Two Stages to Orbit (TSTO) vehicle.

11. Govt. of India is intended to declare western ghat biodiversity rich areas as eco sensitive zone. Critically analyze the role of ESZ in biodiversity conservation

Environment Protection Act, 1986 does not mention the word “Eco-sensitive Zones”. The purpose of the ESZ was to provide more protection to the parks by acting as a shock absorber or transition zone

Central Government can restrict areas in which any industries, or operations shall not be carried out or shall be carried out subject to certain safeguards and can prohibit or restrict the location of industries on the basis of considerations like

- the biological diversity of an area,
- -maximum allowable limits of concentration of pollutants for an area,
- environmentally compatible land use,
- proximity to protected areas.

The above two clauses have been effectively used by the government to declare Eco-Sensitive Zones or Ecologically Fragile Areas (EFA) and No Development Zones.

Eco-Sensitive Zone Guidelines

The MoEF (Ministry of Environment & Forests) has approved a comprehensive set of guidelines laying down parameters and criteria for declaring ESAs.

These include

- Species Based (Endemism, Rarity etc)
- Ecosystem Based (sacred groves, frontier forests etc) and
- Geomorphologic feature based (uninhabited islands, origins of rivers etc).

The National Wildlife Action Plan (2002–2016) of the Ministry of Environment, Forest and Climate Change (MoEFCC) stipulated that state governments should declare land falling within 10 km of the boundaries of national parks and wildlife sanctuaries as eco fragile zones or ESZs under the Environmental (Protection) Act, 1986.

Analysis of ESZ IN BIO DIVERSITY COSERVATION

- The purpose of declaring an Eco-Sensitive Zone is to create a buffer zone, where activities will be regulated to protect areas demarcated as Protected Areas

- Eco-Sensitive Zones are being touted by the government as transition zones around protected forest areas, that would minimize forest depletion and man-animal conflict.
- Prohibited activities include commercial mining, stone quarrying and crushing units, setting up of sawmills and industries causing water, soil, air or noise pollution, commercial use of firewood, use of plastic bags and others.
- Regulated activities include construction of hotels and resorts, felling of trees and extraction of groundwater.
- No new thermal power plants and/or expansion of existing ones will be permitted.
- Industries which have been classified under the 'red' category by the Central Pollution Control Board (CPCB) will not be allowed in the ESZs
- Prohibition of projects, constructions, and townships beyond a certain limit is made in ESZ
- It also allows hydro-power projects and focuses on the sustainable development of the populace living in the region.

Thus, notifying an area as an eco sensitive zone protects the sensitive and fragile areas from disintegration which supports the flora and fauna of the region ensuring sustainable development.

12. Uttarakhand was in news due to forest fires. Critically analyze forest fires and its environment impacts.

- Forest fires in the hills of Uttarakhand have damaged valuable natural resources.
- Forest fire is a common phenomenon during summer in Uttarakhand. However, this time, the fire started in February and spread to most forest areas of the state.
- The major reasons for forest fires in Uttarakhand are the highly inflammable material of dry chirr pine needles and the dry-leaf litter of broad-leaved trees on the forest floor associated with chirr pine. Chirr pine covers a significant forest area (about 16 per cent) in the state and, every year, encroaches on the mixed species area due to its hardy nature as well as the ban on green felling above 1,000 meters.
- The chir pine itself is highly resistant to fire due to thick bark but the fallen dry needles are highly inflammable and its open resin ducts are considered a main catalyst for fires in pine forests.
- Chir pine needles, though used for bedding material for livestock, compost, biomass energy, etc, cannot be utilized on a mass scale. Unfortunately, in recent years, mass migration of villagers from the state has also checked the local utilisation of the needles, leaving more fuel for forest fires.
- Himalayan forests are spread over difficult and inaccessible terrain, which forest officials cannot access without the help of locals. It's difficult even for the forest department to cope with the situation. Scant rains, with a dry spell in winter, have also led to early forest fires.
- There are already preventive and remedial measures for forest fires, implemented by the state and Central governments in vulnerable areas with sufficient fund allocations. There's also a scope for involving local communities, NGOs and community-based organisations to minimise fire hazards.
- Van Panchayat is a unique model in Uttarakhand, effectively managing forests for a long time. But forest communities need capacity-building and acquaintance with modern methods of combating forest fires.

ENVIRONMENTAL IMPACTS

The Uttarakhand fire tragedy has burnt down at least 1,900 hectares of forest. The area is equivalent to 3,000 football fields, except with a further thousand fold ecological impact.

The fire is raging across Himalayan terrain and dense forests of various types, which are home to animals like bears and tigers, thousands of butterflies and insects, and, of course, hundreds of human communities.

The fires affect each differently, and the system as a whole. Here are the five biggest impacts the fires have.

Insects

The impact of forest fires is felt most by insects, who cannot withstand the high temperatures. They are unable to escape fires. The loss of insects of all kinds has a significant impact on the forest ecosystem.

Most importantly, the process of pollination is hampered, which will eventually affect the growth of plants and crops in the region.

A study conducted in Sal forests of Uttarakhand, and published in early 2016, found a decline in insect population for all four seasons following a fire.

This was not just because all the insects and their eggs had been destroyed, but because their home, the soil, had changed.

Soil health

A forest fire causes several changes in soil. It reduces moisture, increases acidity, and reduces humus, the nutrient-rich top layer of soil. Because of the loss of insects, the soil is not porous enough.

Fires also burn away the thick layer of litter on the forest floor, which helps retain humidity and moisture in the soil, essential for sustaining life.

Because of all these changes, the kind of organisms living in the soil changes, compounding the changes in the soil properties.

On local communities

Forest fires deplete the non-timber produce that locals take from forests for various purposes, including fodder for cattle, roots, fruits, etc.

This adds to the long-term loss to agriculture and horticulture, because there are fewer insects doing pollination.

Wildlife

Large mammals, like bears, are able to escape the fires, but their homes get destroyed, which is active in. Birds, too, are able to escape the flames, but their nests and eggs do not.

Because animals' habitats are destroyed, it affects raising the young until the forest is rejuvenated.

The loss of insects, trees and the lack of pollination affects the entire food chain in the forest, eventually affecting all animals.

Glaciers

There is some speculation about glaciers melting, although no scientific study has been carried out in this regard.

The idea is that soot from the fires can deposit on the glaciers, increasing their capacity to absorb heat. This would make glaciers melt faster.

Understandably, the water from the melting glaciers (eventually flowing into major north Indian rivers) will be polluted in a high quantity.

The warmer climate due to the fire will also cause additional melting. Besides, because the soil has lost its moisture, the monsoon rainfall will cause higher soil erosion, and higher water run-off, also raising water levels in streams and rivers

13. Environment impact assessment studies are crucial for locating any industry in eco sensitive region. Discuss the environment impacts of hydro power projects smaller than 25MW.

- Ans.**
- Small Hydropower (SHP), considered as the non-polluting renewable energy source having high conversion efficiency, flexibility and operational & economic superiority over other power generation

modes up to 25 MW, has been accorded top priority by Ministry of New & Renewable Energy sources (MNRE), Government of India due to its environment friendly nature.

- Environment impact assessment (EIA) can be used as a tool to assess the environmental impacts of SHP projects in preconstruction, construction and post construction phase. Ministry of Environment & Forest (MOEF), Government of India has set the guidelines for EIA, preparation of Environment Management plan (EMP) and monitoring of mitigation measures for large number of industrial, construction & other projects including power projects

The Positive impacts of these SHP are

- Substitutes thermal power plants hence no emissions of CO₂ and other pollutants in electricity generation.
- No construction of Dams involved as this is normally run –of- river. Thus there is less impact on environment as compared to that of large power projects
- No issues like deforestation, resettlements, rehabilitation involved.
- Good and viable alternative for power requirements of remote and isolated areas, hilly areas etc, there by enhancing sustainable economic activities in local areas

Small hydro, which includes so-called mini- and micro-hydro projects on small rivers and creeks. Although designs differ and sometimes rivers do get diverted, small hydro dams are often built as “run-of-river” projects, meaning the flow of the river turns some turbines in the dam to produce electricity without the need to create a reservoir behind those turbines. This can provide cheap, off-grid power, allowing rural areas access to electricity.

However, there are many negative aspects also

- It is not environmentally benign, with impacts ranging from the fragmentation of river habitat to the potential for cascading dam failures during the kind of flooding experienced in Uttarakhand recently.
- Due to their location in sensitive areas, local impacts are not always negligible.
- A high-head SHP project in mountains, being situated in a highly sensitive area, is more likely to generate impact than an integral low head scheme in a valley. The tail water from the power plant reenters the river and entire areas of the river may be bypassed by a large volume of water, when the plant is in operation.
- The impact generated by construction of hydraulic structures include the loss of ground, the construction and maintenance roads, working platforms, excavation works, blasting and concrete manufacturing plants.
- Other non negligible impacts are the barrier effect and the alteration of flow consequent to river regulation that did not exist before. To mitigate such impacts it is recommended that the excavation work should be undertaken in the dry season and the disturbed ground restored as soon as possible. In any case these impacts are always transitory and do not constitute a serious obstacle to the administrative authorization procedure
- The turbines can cause noise impacts. This can be mitigated by insulating them.
- All components of SHP should be skillfully inserted into the landscape otherwise it may result in landscape impact.
- The reduction on flow in the stream bed between the intake and the tail race downstream of the powerhouse may affect the life of fishes if they exist in the water. In high flow period, the water spills over the weir and floods the stream bed. Such frequent changes from semi dry to wet conditions can make problems for aquatic life.

14. Global warming is the most discussed topic of any multilateral summit. The Paris climate agreement reached at the conference of parties 21, is how effective to deal with the crisis of global warming in the present scenario.

Ans. At COP 21 in Paris, parties to UNFCCC reached a historic agreement to combat climate change and to accelerate and intensify the actions and investment needed for a sustainable low carbon.

The Paris agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2°C above pre-industrial levels and pursue efforts to limit the temperature increase even further to 1.5°C.

The Paris agreement requires all parties to put forward their best efforts through Nationally Determined Contributions (NDC's) and to strengthen these efforts in the years ahead.

There will be a global stock taking every 5 years to assess the collective progress towards achieving the purpose of the agreement and to inform further individual actions by parties.

The agreement also extended the current goal of mobilizing \$100 billion a year in support by 2020 through 2025.

So as this agreement involves all countries of the world through various means by having a proper review mechanism will help the global climate change.

15. Exotic species are proving to be a new threat to biodiversity. How is the increased shipping industry responsible for the loss of biodiversity? Critically discuss.

Ballast water discharged by ships can have a negative impact upon the marine environment.

Cruise ships, large tankers, and bulk cargo carriers use a huge amount of ballast water which is often taken on in the coastal water in one region. After ships discharge waste water or unload cargo and discharge at the next port of call wherever cargo is located.

Ballast water discharge typically contains a variety of biological materials including plant species, virus, invasive animals etc.

In the wake of port development and the Bharat Mala project, various new exotic invasive species are going to enter the Indian marine environment which have the potential to replace the indigenous species and will cause harm to biodiversity.

Thus, the government needs to draft proper guidelines to treat ballast water before its release. As in the wake of inland port development, these threats could harm biodiversity in aquatic species also.

The International Maritime Organization lists the ten most unwanted species as

- Vibrio cholera
- Caldocera water flea
- Mitten crab
- Toxic algae
- Round goby
- North American comb jelly
- North Pacific sea star
- Zebra mussel
- Asian Kelp
- European green crab

16. In order to curb the pollution especially air and land pollution, govt. issued construction and demolition waste management rules 2016. Critically discuss its effect on environment

These rules were notified to effectively tackle the issues of pollution and waste management. The basis of these rules is to recover, recycle and reuse the waste generated through construction and demolition. It has following salient features.

- The segregating construction and demolition waste and depositing it to the collection centers now will be responsibility of every waste generator.
- The local bodies will have to utilize 10-20% material from construction and demolition waste in municipal and government contracts.
- Cities with a population more than one million will commission processing and disposal facility within 18 months from the date of final notification of these rules.
- While cities with a population of less than 0.5 million will have to provide these facilities within three years.
- And cities with population of 0.5 to 1million will have to provide facilities within two years.
- The permission for construction will be given only when the complete construction and demolition waste management plan is presented.
- Large generators of waste will have to pay relevant charges for collection, transportation processing and disposal as notified by concerned authorities.

17. How bio glass is going to be a boon for humanity. Elucidate

Bio active glasses are a group of surface reactive glass ceramic bio materials and include the original bio active glass (Bio glass).

The Bio compatibility and Bio activity of these glasses has led them to be investigated extensively for use as implant materials in the human body to repair and replace diseased and damaged bone.

They could be used for

- Synthetic bone graft material
- Cochlear implant
- Bone tissue engineering
- Treating dentine hyper sensitivity
- Promoting enamel remineralisation.

Thus, bio glass is going to be proved as a boon for the humanity.

18. As Government of India is aiming for 100 GW Solar power production by 2022 how can grapheme could be used to make this a success.

Ans. Nano technology is proving to be a new cutting edge tool in development which could be used in solar mission in the following ways

- Nano scale materials such as nano cells are if used in solar cells will helps to make them cheaper and more efficient.
- Honey comb lattice of carbon atoms in grapheme could be of immense importance for National Solar Mission as-
- Graphene coated solar panels can produce electricity from rain drops. This will increase efficiency of solar panel as India is a country of monsoon.
- As rain water contains salt which in turn contains positive and negative ions which can be used to

generate electricity.

- As graphene is stronger than steel and it is a good conductor of heat and electricity, it will make panels more durable.

19. Crisis management, a governance issue that is both vital and complex, is at the core of India's administrative system. What is needed is ushering in a new paradigm in the quality and efficacy of our institutional capacity and delivery mechanisms while ensuring, at the same time, that they are embedded in both the structures of authority and the mechanisms of accountability

Ans. Crisis management involves the careful management of any crisis, whether it be a natural disaster or manmade one. The quality and efficiency of our institutional capacity and delivery mechanism is very important in ensuring the proper implementation of the plans made to manage the crisis.

- Recent occurrence of Smog in Delhi, Chennai flood, draughts in many parts of the country, - in all instances, there was a poor display of institutional inefficiency and foresightedness. The effects of these crisis would not have been too severe if the institutional and delivery mechanism had a humanistic and systematic approach based on real quality.
- Crisis administration is primarily the responsibility of the State. It should be kept In mind that “Prevention is better than Cure”. Going in compliance with the Bharat Norms of the Central Government, Delhi government could have considered Crackers as sin goods and taxed them more together with steps to prevent burning of paddy residue. It could have resorted to technologies like cloud seeding when it have prior information regarding the poor air quality of the National capital. In the case of Chennai, the conservation and preservation of the wet lands had to be taken as a primary concern. Thus, the entire structure of crisis management should be based on prevention of the crisis(if possible) and then post disaster relief and rehabilitation.
- Crisis situations has to be reviewed in a day to day basis and the institutional and delivery mechanism should be strengthened for that task.
- Implementing the policies and plans in a holistic and integrated approach is the key for proper crisis management and this is based on the acumen of those who leads the institutions of governance. This is same in the case of natural disasters as well as socio economic political military and diplomatic crisis that can affect the stability and prosperity of the country.
- Innovative thinking, proper application of research and development and scientific technologies and exploiting the human resources and other raw materials is also very important.
- Fundamental changes in the levels of administration that enables a quick and emergency response and increasing the effectiveness of the machinery to meet the crisis situation is the need of the hour.
- Planning and implementation of the plans in a coordinated, holistic and integrated approach is very much needed. Enabling every levels of administration, right from the panchayath level along with special executive bodies for crisis management, capacity building embracing all sections of the community and application of science and technology in its full potential can only be done when these system are all embedded in the structure of authority and accountability.

20. We cannot prevent natural hazards, which are endemic to our geology, geography, climate, social and cultural settings, but we can certainly strive to manage crisis more efficiently so that hazards do not degenerate into disasters. Discuss.

- Natural hazards like flood, draught, earth quake etc become disasters if any single mistake is made in managing these disasters. Any disaster can interrupt essential services and can seriously affect the health, social and economic networks of local communities and countries. There should be a proper disaster management plan which cover prevention, preparedness, relief and recovery.

Prevention

Prevention of natural hazards cannot be made. Still many steps can be taken to prevent them from becoming a disaster to humanity.

- These are activities designed to provide permanent protection from disasters. Not all disasters, particularly natural disasters, can be prevented, but the risk of loss of life and injury can be mitigated with good evacuation plans, environmental planning and design standards.
- In January 2005, 168 Governments adopted a 10-year global plan for natural disaster risk reduction called '**The Hyogo Framework**' which offers guiding principles, priorities for action, and practical means for achieving disaster resilience for vulnerable communities.

Preparedness

- Preparedness is the main way of reducing the impact of disasters.
- These activities are designed to minimise loss of life and damage – for example by removing people and property from a threatened location and by facilitating timely and effective rescue, relief and rehabilitation
- Community-based preparedness and management should be a high priority in physical therapy practice management.

Disaster relief

- Relief activities include rescue, relocation, providing food and water, preventing disease and disability, repairing vital services such as telecommunications and transport, providing temporary shelter and emergency health care
- This is a coordinated multi-agency response to reduce the impact of a disaster and its long-term results

Disaster Recovery

- Once emergency needs have been met and the initial crisis is over, the people affected and the communities that support them are still vulnerable.
- Recovery activities include rebuilding infrastructure, health care and rehabilitation. These should blend with development activities, such as building human resources for health and developing policies and practices to avoid similar situations in future.

Strengthening Institutional mechanism and capacity building

- The disaster management institutions have to be strengthened to mitigate the effects of the disaster. Implementing the policies and plans in a holistic and integrated approach is the key for proper disaster management and this is based on the acumen of those who leads the institutions of governance.
- Innovative thinking, proper application of research and development and scientific technologies and exploiting the human resources and other raw materials is also very important.
- Fundamental changes in the levels of administration that enables a quick and emergency response and increasing the effectiveness of the machinery to meet the crisis situation is the need of the hour.
- Planning and implementation of the plans in a coordinated, holistic and integrated approach is very much needed. Enabling every levels of administration, right from the panchayath level along with special executive bodies for crisis management, capacity building embracing all sections of the community and application of science and technology in its full potential can only be done when these system are all embedded in the structure of authority and accountability.

Above all, nature have a dynamic balance with it can maintain its stability and endurance. Once this ability is lost, natural hazards become unpredictable and cannot be tamed. This balance very much depends on preserving the environment and eco system. This should be the first priority of any mechanism that is committed to mitigate the natural hazards.

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