Introduction to Environment and Environment Audit

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Presentation Plan

1. What is environment
2. Global trends & concerns related to environment
3. Sustainable development
4. Understanding environment audit, themes in environment audit
What is Environment

- Surroundings in which an organization operates
  - Includes air, water, land, natural resources, flora, fauna, humans and their interrelation
- Combination of external physical conditions that affect and influence growth, development & survival of organisms
Components of environment

- **Abiotic factors**
- **Biotic factors**
Unsustainable use of resources for development has led to:

**Environment degradation**
- Increase in levels of pollution
- Deforestation
- Loss of biodiversity

**Climate change**
- Altered weather patterns
- More extremes in weather like storms, droughts etc
Environment degradation

- Environment degradation occurs:
  - When nature's resources are being consumed faster than nature can replenish them
  - When pollution results in irreparable damage to the environment
  - When human beings destroy or damage ecosystems in the process of development

As Gandhiji put it “There is a sufficiency in the world for man's need but not for man's greed”
Environment degradation

- Major causes include urbanisation, industrialization, waste dumping, intensive farming, over fishing, etc.
- Reduces the adaptive capacity of societies to deal with disaster.
- Theoretically, the long term result of environmental degradation would result in local environments that are no longer able to sustain human populations to any degree.
  - Such degradation on a global scale would, if not addressed, of course mean extinction for humanity.
- More...
Further readings

- http://www.unep.org/
- World Risk Report, 2012
- http://unfccc.int/2860.php
- http://www.earthtimes.org/
- http://www.iucn.org/
- http://wwf.panda.org/
GLOBAL ENVIRONMENTAL TRENDS
Environmental Issues

- Loss of biodiversity
  - Destruction of Forests
  - Destruction of other habitats
- Decrease in Water availability
- Dumping of waste
  - Pollution of water
  - Pollution of land resources
- Climate Change
  - Air pollution
- Rise in environment crimes
Loss of Biodiversity
Loss of Biodiversity

- **Biodiversity**: degree of variation of life forms within a given species, ecosystem, biome, or an entire planet
- Fewer than 10% of the world’s described species have thus far been assessed to determine their conservation status
  - Out of these, over 16,000 species have been identified as threatened
- Rates of species extinction are 100 times higher than baseline rate shown in fossil records
  - Some 10-30% of the mammal, bird and amphibian species threatened with extinction, due to human actions
Loss of biodiversity

- At threat of extinction are: 1 out of 8 birds, 1 out of 4 mammals, 1 out of 4 conifers, 1 out of 3 amphibians, 6 out of 7 marine turtles etc

- Number of endangered species in India accounts for around 8.86% of the world`s mammals

- Pressure on biodiversity directly linked to the continuing increase in global human population
  - Habitat destruction and fragmentation due to urbanization, industrialization and demand of land for agriculture
Destruction of Forests
Destruction of Forests

- Forests currently cover about 4 billion hectares and cover 31% of Earth’s land surface
- Over past 50 years, half the world's original forest cover has been lost
  - most significant cause: humans beings' unsystematic use of its resources
  - Population growth & burgeoning demand for food, fibre and fuel accelerated pace of forest clearance
- The main changes in land use at the global level since 1987 have been a loss of forest (an average of 73,000 km² annually) with concomitant increases in farmland, urban areas & woodland/grassland
Destruction of Forests

- Forest has mostly been converted into farmland
- Lands formerly used as farmland have been converted into urban areas

- The most dramatic impact is a loss of habitat for millions of species
  - 70% of Earth’s land animals and plants live in forests, and many cannot survive the deforestation that destroys their habitat

- In India, State of Forest report recorded a loss of forest cover in last 2 years
  - Quality of forest cover/productivity from forest areas declined, due to biotic pressure like grazing, human interference, habitat fragmentation, forest fires etc
  - Some increase in forest cover attributed to plantations/limited harvesting of timber
Destruction of other habitats
Destruction of other habitats

- Habitat destruction is currently ranked as the primary cause of species extinction worldwide
- Marine habitat: most at threat
  - About a third of all coral reefs are expected to vanish in the next 30 years
  - More than a quarter of sea grass meadows lost in the past 130 years which shelter turtles, provide fodder for fishes etc.
- Freshwater habitats
  - Essential for human survival, providing the majority of people's drinking water.
  - Home to more than 40% of the world's fish species
  - More than 20% of the 10,000 known freshwater fish species have become extinct or imperiled in recent decades
Decrease in Water availability

“When the well is dry, we learn the worth of water.”

Ben Franklin
Available freshwater resources continue to decline.

Reasons:

- Excessive withdrawal of surface & groundwater
- Decreased water runoff from land surface due to climate change
- Use of freshwater for agriculture, industry and energy increased markedly over the last 50 years
- Human water use exceeds the average annual natural water replenishment in many parts of the world

Ground water supplies continued to deteriorate since 2000
Decrease in Water availability

- In India: per capita availability 1545 cubic m (2011)
- Reducing progressively due to increase in population
  - Total water availability/capita expected to decline to 1,240 cubic m/ person/year by 2030
    - Perilously close to the 1,000 cubic m benchmark set by World Bank as “water scarce”
A World of Salt
Total Global Saltwater and Freshwater Estimates

Saltwater 97.5%
1 365 000 000 km³

Freshwater 2.5%
35 000 000 km³

0.3% Lakes and river storage
30.8% Groundwater, including soil moisture, swamp water and permafrost
68.9% Glaciers and permanent snow cover

Water- and Population Allocation

- North and Central America: 15% water, 8% population
- South America: 26% water, 6% population
- Europe: 8% water, 13% population
- Africa: 11% water, 13% population
- Asia: 36% water, 60% population
- Australia and Oceania: 5% water, <1% population
Dumping of waste & pollution of water & land resources
Most waste from cities and industries dumped on land and in freshwater ecosystems
- Leads to land degradation, pollution of rivers/lakes and ground water
- Specific problem is leachate

Medical waste, household waste, industrial waste assuming unmanageable proportions
- Also driven by consumption patterns and production processes

E-waste emerging as a major source of pollutants

Waste from agriculture contaminates land as well as water sources
- Hospital waste a source of infection
- Illegal dumping of waste has direct repercussions on human health
Water Pollution
Water Pollution

- Water pollution & degradation of aquatic ecosystems directly affect human health
  - Contaminated water remains the greatest cause of sickness and death
  - Microbial pollution from inadequate sanitation facilities, improper wastewater disposal and animal waste major concerns
  - 3 million people die of water-related diseases every year in developing countries, mostly children under five
- In India almost 70% of surface water and large % of groundwater contaminated by biological, toxic, organic and inorganic pollutants
  - India’s rivers receive millions of liters of sewage, industrial and agricultural wastes
  - Lakes and reservoirs all over the country also in varying degrees of environmental degradation
Pollution of Marine & Coastal Areas
Pollution of Marine & Coastal Areas

- Over 80% of marine pollution comes from land-based activities
- Many coastal and marine ecosystems & most freshwater ecosystems continue to be heavily degraded or lost, along with the services they provide for humanity
- From plastic bags to pesticides - most of the waste produced on land eventually reaches the oceans, either through deliberate dumping or from run-off through drains and rivers
  - This includes oil spills, fertilizers solid garbage, sewage, toxic chemicals etc
Land pollution
Land pollution

- Overgrazing: 20% to 35% of pasture and grasslands damaged.
- The causes of land degradation are mainly anthropogenic and mainly agriculture related.
  - Major Causes: are Land clearing and deforestation, Agricultural mining of soil nutrients, Urban conversion, Irrigation etc.
- Desertification: Some 10 to 20% of drylands are already degraded, and ongoing desertification threatens the world’s poorest populations and the prospects of poverty reduction.
- More than 250 million people are directly affected by desertification.
Climate change
Climate change

- Climate change
- Our planet warming faster than at any time in the past 10,000 years
  - Greenhouse effect driven by gases like CO₂ which have reached their highest level for more than 400,000 years
- Global atmospheric concentrations of greenhouse gases increased markedly as result of human activities
- In 2005 concentration of CO₂ exceeded by far the natural range over the last 650,000 years
Direct observations of recent climate change

Changes in temperature, sea level and northern hemisphere snow cover

Global average temperature

Global average sea level

Northern hemisphere snow cover
Effects of climate change

- Some ecosystems are highly vulnerable:
  - Coral reefs, marine shell organisms
  - Tundra, boreal forests, mountain and Mediterranean regions
  - 20-30% of plant and animal species at risk of extinction

- Some regions will be more affected than others:
  - The Arctic (ice sheet loss, ecosystem changes)
  - Sub-Saharan Africa (water stress, reduced crops)
  - Small islands (coastal erosion, inundation)
  - Asian mega-deltas (flooding from sea and rivers)
Coastal settlements most at risk

Map showing the locations of coastal settlements at risk.
Air pollution
Pollutants of major public health concern include particulate matter, carbon monoxide, ozone, nitrogen dioxide and sulfur dioxide.

- Outdoor and indoor air pollution cause respiratory and other diseases, which can be fatal.
- Fifth leading cause of death in India.
- Nearly 2 million people die prematurely from illness attributable to indoor air pollution from household solid fuel use.
- Urban outdoor air pollution estimated to cause 1.3 million deaths worldwide per year.
Air pollution

- Increasing numbers of cars, emissions from coal based power plants, human activities involving the burning of gasoline and natural gas are related to the emission of gases which cause air pollution
  - In most Indian cities the ambient particulate emissions exceed, sometimes dramatically, the current national standard
  - According to the WHO, across the G-20 economies, 13 of the 20 most polluted cities are in India and over 50% of the sites studied across India had critical levels of particulate matter
Environment crimes
Environment crimes

- Rise in demand for wildlife products like orchids, rhino horns, corals, tiger skin and claws, ivory etc
- Not restricted by borders, and can affect a nation’s economy, security and even its existence
  - Serious and growing international problem
  - 22 rhinos poached in Kaziranga National Park in 2012
  - In 2012, the number of elephants killed in Africa numbered more than tens of thousands
Environment crimes

- Over-fishing of fishes like sharks, blue fin tuna
  - loss of biodiversity: about 80% of the world marine fish stocks for which assessment information is available are fully exploited or overexploited

- Illegal logging: An estimated €10–15 billion is lost through illegal logging globally each year
  - threatens some of the most valuable forests globally – from the Amazon to the Russian Far East
## Humanity’s Success in Resolving the 90 Most Pressing Environmental Issues

UN experts have identified the key environmental issues and analyzed progress on each of them over the past few decades.

<table>
<thead>
<tr>
<th>Number of objectives</th>
<th>Some key objectives and progress made on them</th>
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<tbody>
<tr>
<td>4</td>
<td><strong>Significant progress made</strong></td>
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<tr>
<td></td>
<td>- Stopping the production and use of substances that deplete the ozone layer</td>
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<td>- Removal of lead from fuel</td>
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<td>- Increasing access to higher-quality water supplies</td>
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<td></td>
<td>- Intensifying research on reducing marine pollution</td>
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<tr>
<td>40</td>
<td><strong>Some progress made</strong></td>
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<tr>
<td></td>
<td>- Expansion of protected natural areas</td>
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<td></td>
<td>- Fight against deforestation</td>
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<td>- Reducing the proportion of the world’s population suffering from starvation</td>
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<td>- Improving sanitary conditions (sewage, garbage disposal, etc.)</td>
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<tr>
<td>24</td>
<td><strong>Little or no progress made</strong></td>
</tr>
<tr>
<td></td>
<td>- Fight against climate change, reduction in greenhouse gas emissions</td>
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<td>- Fight against biodiversity loss</td>
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<tr>
<td></td>
<td>- Increase in food production</td>
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<td></td>
<td>- Fight against desertification</td>
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<tr>
<td>8</td>
<td><strong>The situation continues to deteriorate</strong></td>
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<td></td>
<td>- Prevention of droughts and floods</td>
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<td>- Protection of wetlands</td>
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<tr>
<td></td>
<td>- Protection of marine ecosystems (for example, coral reefs affected by rising temperatures and water acidity)</td>
</tr>
<tr>
<td></td>
<td>- Fight against coastal pollution</td>
</tr>
</tbody>
</table>

Scientists did not have enough data to assess progress on a further 14 issues.
Further readings

- Global Environmental Outlook Report – 5
- Environmental Performance Index 2012
Response to global threats to environment

- Concept of Sustainable Development was evolved in 1983 by the World Commission on Environment and Development (WCED)
- ‘sustainable development’ means development that ‘meets the needs of the present without compromising the ability of future generations to meet their own needs’
  - Recognizes the need for a balance or trade-off between economics, social progress and environment
  - Does not focus solely on environmental issues
3 pillars of Sustainable Development

- Environment
- Social factors
- Economic factors

Sustainable development policy
International efforts

- **UN Conference on Environment and Development, Earth Summit**, held in Rio in June 1992
  - Milestone event, effectively focusing the world's attention on environmental & development problems faced by global community
  - Brought together 172 nations, 108 heads of state, 1400 non-governmental organisations (NGO’s), and about 8000 journalists from all over the world with the objective of preparing the world for attaining the long-term goals of sustainable development

- **Agenda 21**, the world's plan of action for sustainable development, adopted by the international community at the 1992 Earth Summit in Rio
  - Landmark achievement, incorporating environmental, economic and social concerns into a single framework
International efforts

- Ten years later, *World Summit on Sustainable Development* in held in Johannesburg in 2002
  - Objective was to review the developments of the past decade & to forge a cohesive global partnerships to achieve a comprehensive implementation of Agenda 21

- *Commission on Sustainable Development* (CSD) created in December 1992 to ensure effective follow-up of the 1992 Earth Summit

- *Rio +20 conference* organised in June 2012, 20 years after Earth Summit
  - Objective is to secure renewed political commitment for sustainable development, assess the progress to date and the remaining gaps in implementation
Some International Treaties on environment

1. Convention on Biological Diversity, signed on 05/06/1992, ratified by India 18/2/1994
2. Convention to Combat Desertification - signed on 14/10/1994, ratified by India on 17/12/1996,
Further readings

- Our Common Future: Report of the World Commission on Environment and Development
- Agenda 21
- Key Environment Indicators: Tracking progress towards environment sustainability
- INTOSAI WGEA: The Audit of International Environmental Accords
Understanding environment audit
What is Environment Audit

- General definition
  - *Environmental audit* is a general term that can reflect various types or evaluations intended to identify environmental compliance and management system implementation gaps, along with related corrective actions.
  - Evaluations based on criteria which may be local, national or global environmental standards.
    - Thus it is a systematic process of obtaining and evaluating information about the environmental aspects.
At the XV INCOSAI in Cairo in 1995, environmental audit (EA) emerged, for the first time, as a major congress theme:

- Provided an overall framework for EA and incorporated sustainable development into governmental policies and programs subject to audit.

Environment auditing

Basic principles underlying this definition are:

- EA is not significantly different from normal auditing as practiced by SAIs
- EA can encompass all types of audit: financial, compliance, and performance audits.
  - With respect to performance audits, the three E’s of Economy, Effectiveness, and Efficiency can be included.
  - Adoption of the fourth E, that is Environment, depends very much on SAIs mandate and its government’s environmental policy but is not critical to carrying out environmental audit
- The concept of sustainable development can be part of the definition, only if it is part of the government policy and/or programme to be audited
Environment audit – Need for it

- Resources spent by the government on environment conservation and protection have grown exponentially
- Rethinking of the role and responsibilities of both governments in light of evidence of environment degradation
- Global awareness of environmental issues has also grown rapidly
  - More scientific knowledge and interest in environment issues like ozone depletion, the destruction of rain forests, and global warming.
- Some of the crucial changes to have taken place are:
  - Expansion of environmental regulation by state and local authorities
  - Increasing cost of environmental protection for both the private and public sectors
Environment audit – Need for it

- Resources spent by both sectors on pollution control have increased, and both businesses and government bodies are looking for more cost-effective ways of dealing with compliance issues.
- Environmental awareness among financial institutions

- Following the UN Conference on the Environment in Rio, governments and corporations around the world shown more concern about sustainable development
- Increasing concern that organisations affecting the environment should be accountable for their actions led to requirements for consequences of those actions to be reported
  - *Implications for SAIs as public auditors*
How do auditors fit in?

- Environmental auditing: catch all term used to describe a range of audit activities with a focus on the environment

- When conducting environment audits auditors might ask the following questions:
  - Is the government complying with international environmental treaty obligations, domestic environmental laws and regulations and government policies and programs?
INTOSAI Guidelines

- Is government meeting environmental performance targets it has set for itself, and what results has it achieved?
- Is government controlling environmental risks from its own operations?
- Has government put in place an effective accountability framework for its environmental policies and programs?
- Do financial statements properly reflect environmental costs, liabilities (including contingent liabilities) and assets?
- Is organization spending money in accordance with financial rules and regulations concerning environmental issues?
Environmental Auditing framework

Regularity audit
- Compliance audit
- Financial audit

Performance audit

Environment Auditing is the 4th E
Types of performance audits on Environmental issues

- Audits of Government monitoring of compliance with environmental laws
- Audits of the performance of Government environmental programmes
- Audits of the environmental impact of other Government programmes
- Audits of environmental management systems
- Environmental assessment of proposed environmental policies and programmes
Framework for environment protection in India

- At central level
  - Ministry of Environment & Forests (MoEF) is the nodal agency in the administrative structure of the Central Government, for the planning, promotion, co-ordination and overseeing the implementation of environmental and forestry programmes

- At state level
  - Department of environment and forests in every state
  - MoEF frames policy for protection and conservation of environment and is implemented by the states
  - States also have power to frame own legislation for protection of environment
Framework for environment protection in India

- Central Pollution Control Board and State pollution Control Boards constituted under Section 3 of the Water (Prevention and Control of Pollution Act, 1974 (6 of 1974)
  - Assigned responsibility for the prevention and control of pollution under this Act
  - Are nodal agencies at the central and the state level to set standards for ambient air/water quality & source specific emissions and effluents and to monitor compliance with them at regular intervals.
Environment legislation in India

- **Important policies**
  - National Environment Policy, 2006

- **Important legislations:**
  - The Environment (Protection) Act, 1986
  - The Water (prevention and control of pollution) Act, 1974
  - The Air (prevention and control of pollution) Act, 1981
  - The Wildlife (Protection) Act, 1972, 2002
  - National Green Tribunal Act
  - Acts relating to waste
  - The Biological Diversity Act, 2002
Conducting environment audits

Choose theme (based on risk assessment)
Waste, water, climate change, biodiversity

Choose kind of audit
Compliance financial audit
Performance Audit

Audit process

Audit Reporting
Some environment audits conducted

- **Compliance**
  - Pollution control in tanneries
  - Working of National Zoo Authority
  - National Biodiversity Authority

- **Performance Audits**
  - Audit of Ganga Action Plan
  - Conservation and protection of Tigers in India
  - Management of Waste in India
  - Water Pollution in India
Further readings


- INTOSAI WGEA Publications:
  - The World Summit on Sustainable Development: An Audit Guide for Supreme Audit Institutions
  - Evolution and Trends in Environmental Auditing
  - Environmental Audit & Regularity Auditing
  - Guidance on Conducting Audits of Activities with an Environmental Perspective
  - Sustainable Development: The Role of Supreme Audit Institutions

- [http://envfor.nic.in/](http://envfor.nic.in/)
Thank you
Environment-biotic and non-biotic factors

- **Abiotic factors**
  - Abiotic, meaning not alive, are non-living factors that affect living organisms
  - Examples: Environmental factors such as habitat (pond, lake, ocean, desert, mountain) or weather such as temperature, cloud cover, rain, snow, hurricanes, etc.

- **Biotic factors**
  - Biotic, meaning of or related to life, are living factors
  - Examples: plants, animals, fungi, bacteria etc
  - Biotic & abiotic factors combine to create a system or more precisely, an ecosystem
  - An ecosystem is a community of living and non-living things considered as a unit
Environment degradation

Definition:

- It is the deterioration in environmental quality from ambient concentrations of pollutants and other activities and processes such as improper land use and natural disasters.

- It reduces the adaptive capacity of societies to deal with disaster risk in many countries around the globe.
Climate change

- Refers to a statistically significant variation in either the mean state of the climate or in its variability, persisting for an extended period (typically decades or longer).
  - Climate change may be due to natural internal processes or external factors, or to persistent anthropogenic changes (man made) in the composition of the atmosphere or in land use.
- Awareness began to dawn in the 19th century that accumulated carbon dioxide in the earth’s atmosphere could create a “greenhouse effect” and increase the temperature of the planet.
  - A perceptible process in that direction had already begun — a side-effect of the industrial age and its production of carbon dioxide and other such "greenhouse gases."
By the middle of the 20th century, it was clear that human action had significantly increased the production of these gases, and the process of “global warming” was accelerating.

Today, nearly all scientists agree that we must stop and reverse this process now — or face a devastating cascade of natural disasters that will change life on earth as we know it.
Much of the evidence is already clear

- Most of the hottest years on record have occurred during the past two decades
- In Europe, the heat wave in the summer of 2003 resulted in over 30,000 deaths
- In India, temperatures reached 48.1 degrees Centigrade — nearly 119 degrees Fahrenheit.
- In 2012, Arctic ice sheet melted almost 80%