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UNIT I

INTRODUCTION AND ENVIRONMENTAL IMPACT ASSESSMENT

- State of global environment- air, land, water, and biodiversity.
- Environmental Impact Assessment (EIA)– Purpose, Global and Indian Scenario.
- EIA- Law, policy, institutional arrangements- water, air, noise, health, cultural heritage.
- EIA – Types, stages, and processes.

Learning outcomes

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- Understanding the drivers of environmental change.
- Global environment status.
- Impact of human activities on the environment, well-being, ecosystem, and food security.
- Reflections of all these toward the understanding of the need for EIA.

State of global environment

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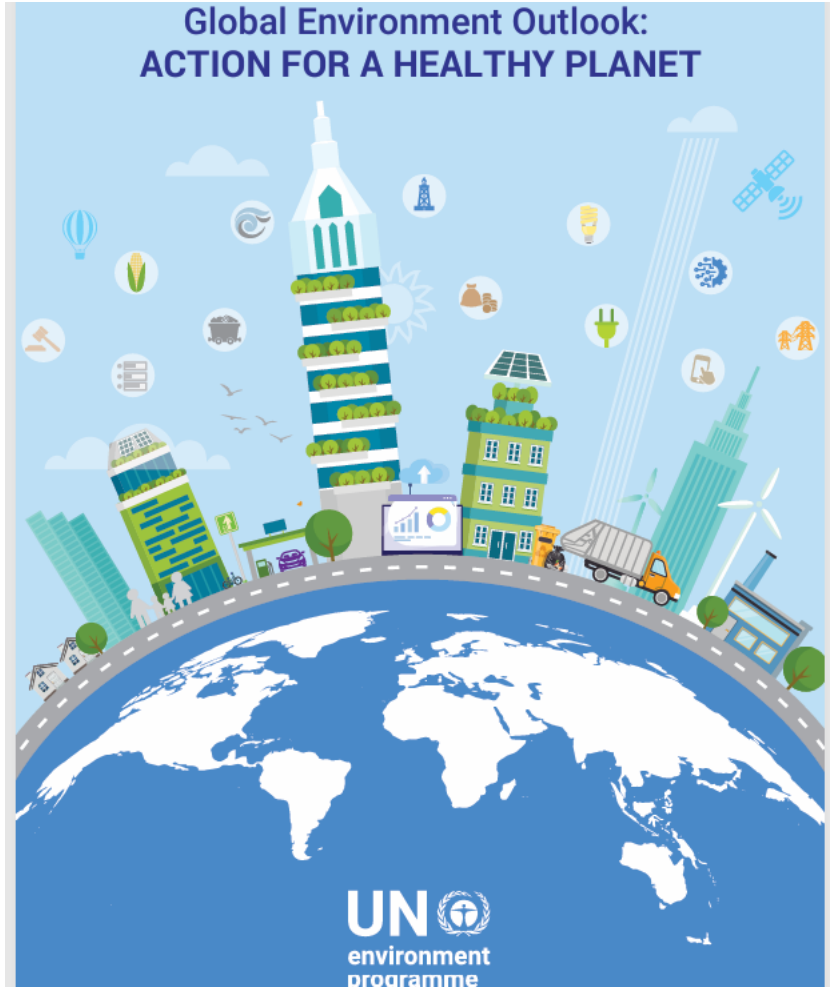
- A healthy environment is the fundamental foundation for human health, well-being and economic prosperity
- **Triple Planetary crisis:** Climate change, Biodiversity loss; Pollution
- Call for the transformation of three interdependent factors: **Energy, food and waste**
- Transformation towards: **Stable climate; nature rich (biodiverse) and near-zero-waste or circular economy**



Triple planetary crisis

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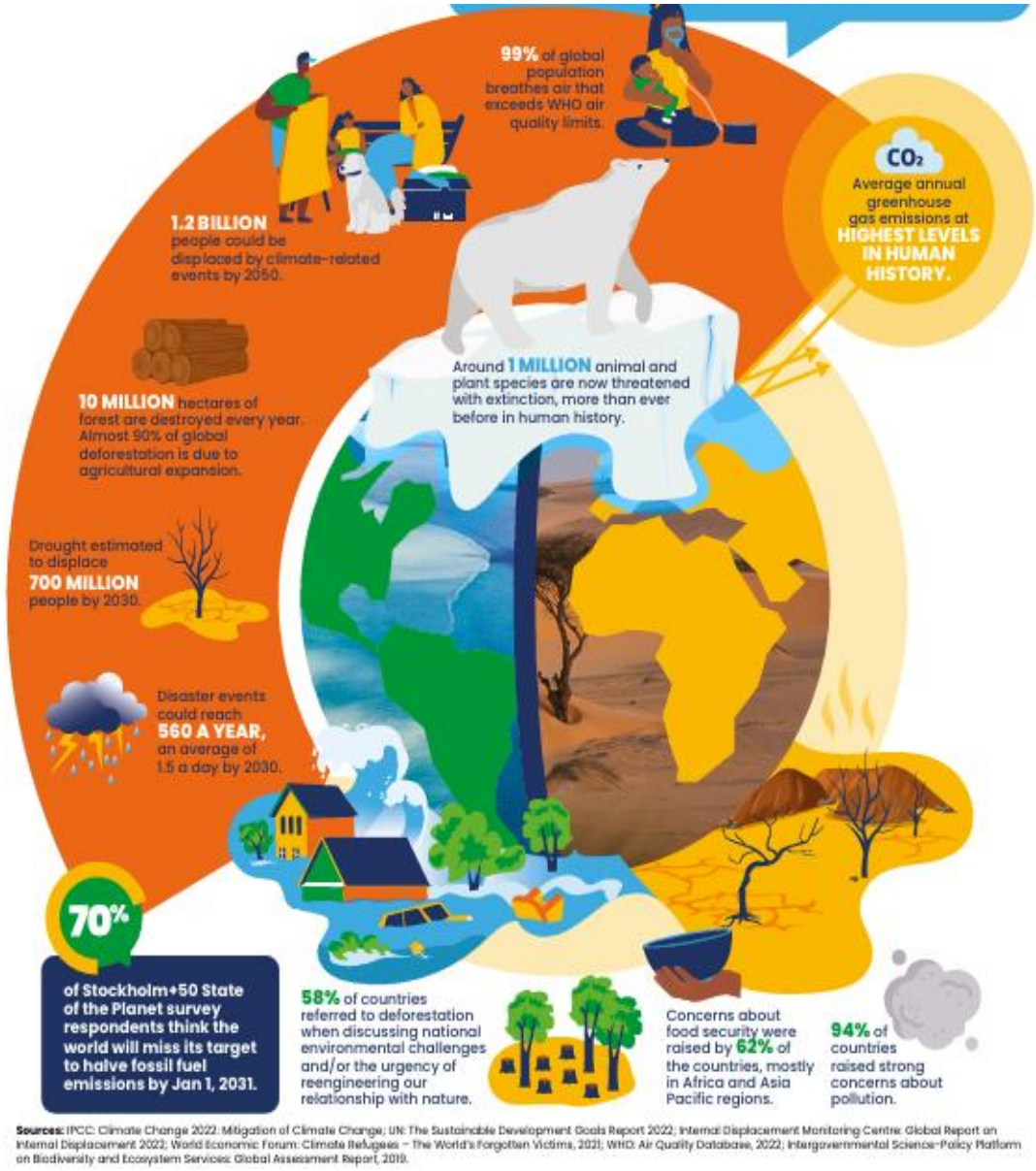

Sources: IPCC: Climate Change 2022: Mitigation of Climate Change; UN: The Sustainable Development Goals Report 2022; Internal Displacement Monitoring Centre: Global Report on Internal Displacement 2022; World Economic Forum: Climate Refugees – The World's Forgotten Victims, 2021; WHO: Air Quality Database, 2022; Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services: Global Assessment Report, 2019.

The sequential transition of environmental movement

The modern environmental movement: **Risk**

- the risk that environmental degradation possesses to human health and well-being.

Environmental movement

The great **smog of London**: December 5th to 9th 1952

- combination of industrial pollution and high-pressure weather
- Thousand of deaths.
- **Clean Air Act, 1956**→ Turning point in the history of environmentalism

Bhopal Gas Tragedy

Bhopal Gas tragedy, 1984

- **Environmental Protection Act, 1986**
- To strengthen pollution control and environmental protection by industries

State of global environment : Air

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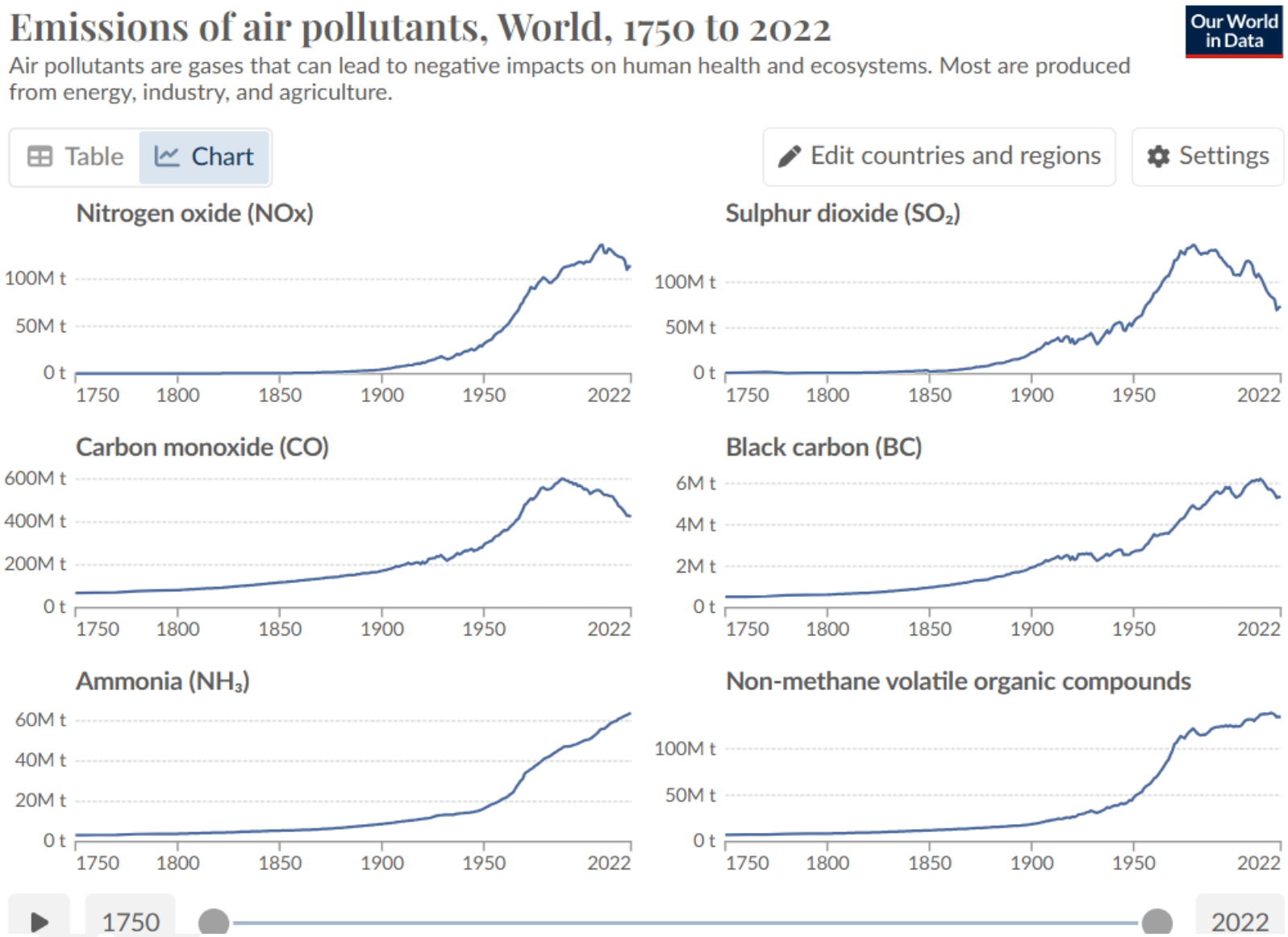


National Ambient Air Quality Standards (NAAQS)

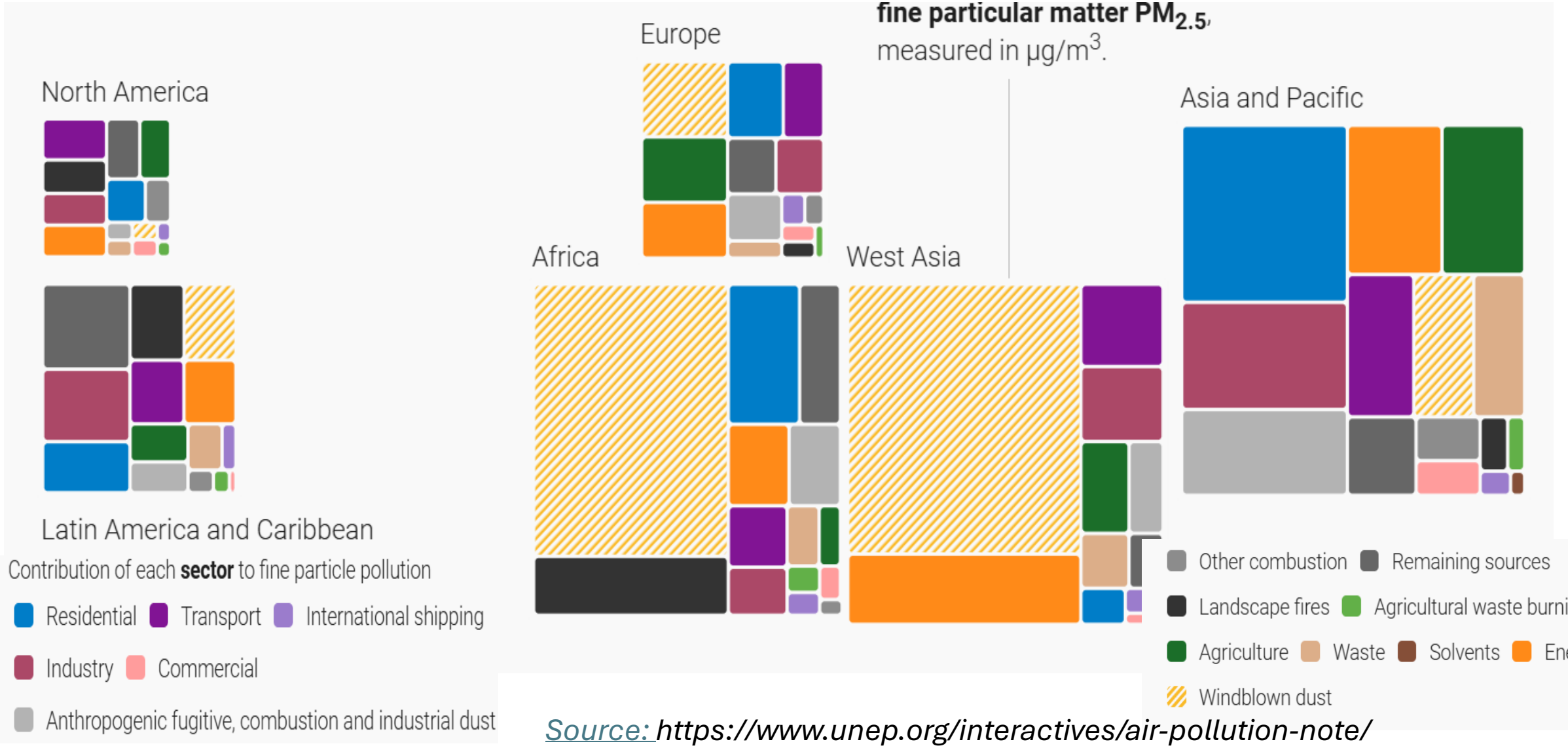
Criteria Pollutants

Air Quality Index

https://airquality.cpcb.gov.in/AQI_India/

In 2021, **99% of the world population** was living in places where the WHO's strictest **air quality levels were not met**.

State of global environment: Air- PM2.5



Source: https://www.unep.org/interactives/air-pollution-note/

State of global environment: Biodiversity

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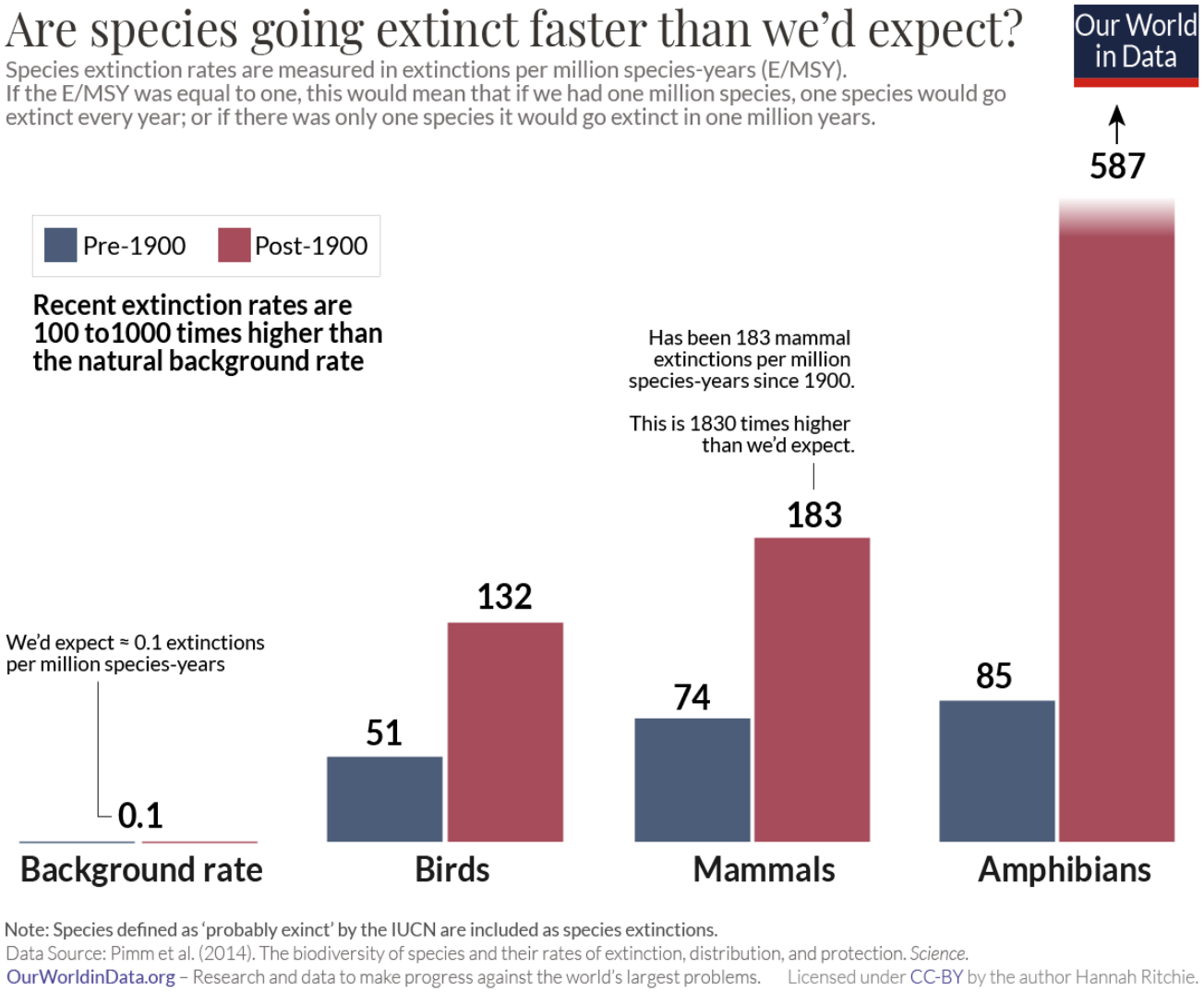

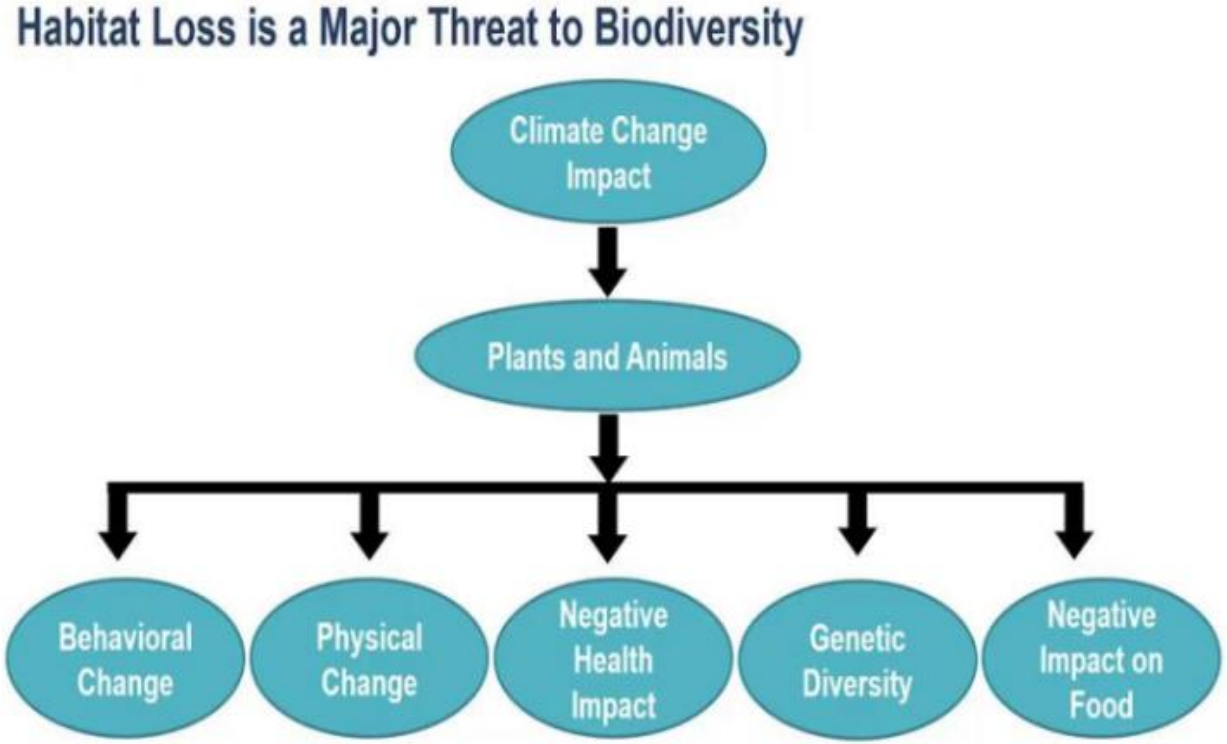

- **Deforestation and other land use changes**
- **Illegal and poorly regulated wildlife trade**
- **Intensified agriculture and livestock production**
- **Antimicrobial resistance**

State of global environment: Biodiversity

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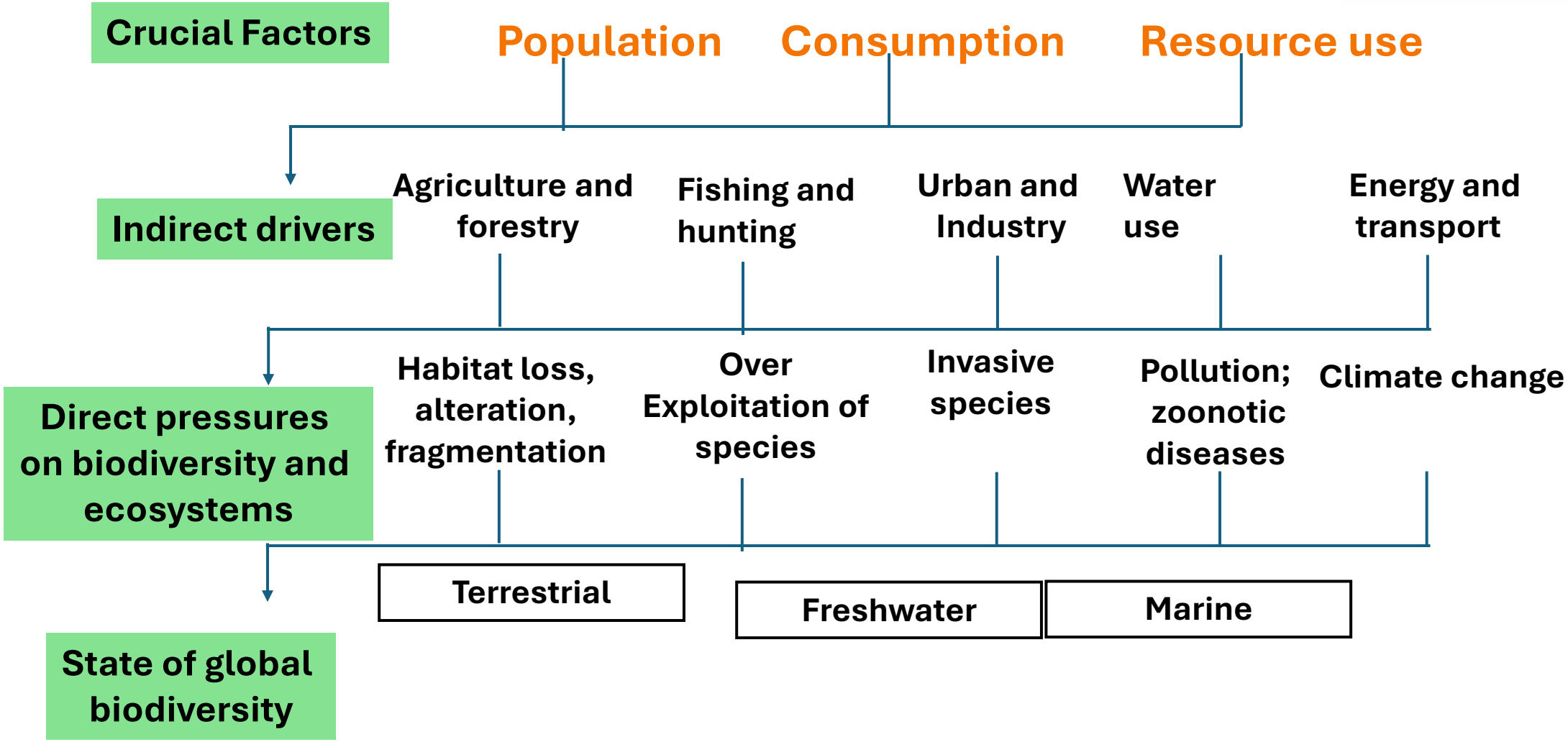

Interconnections between people, biodiversity, ecosystem health and provision of ecosystem services showing drivers and pressures

State of global environment: Biodiversity

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Loss of native species

Male house sparrow in Prospect Park. Photo credit: Rhododendrites/Wikimedia Commons

How sparrows became endangered, lost their homes as we built ours

Studies reveal alarming decreases in sparrow populations across Andhra Pradesh, Kerala, Gujarat, and Jammu Kashmir, with coastal regions experiencing significant declines. The decline is attributed to habitat changes resulting from unplanned urbanization

BY Wahid Bhat | 04 May 2024 | Updated On 04 May 2024 12:37 IST | Follow Us

Invasive species attack

News / India / Worst attack in 27 years: Swarms of locusts destroy crops in several states

Worst attack in 27 years: Swarms of locusts destroy crops in several states

Locust swarms entered India from Pakistan and have made their way into Rajasthan, Madhya Pradesh, Gujarat, Uttar Pradesh and Maharashtra.

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State of global environment: Land

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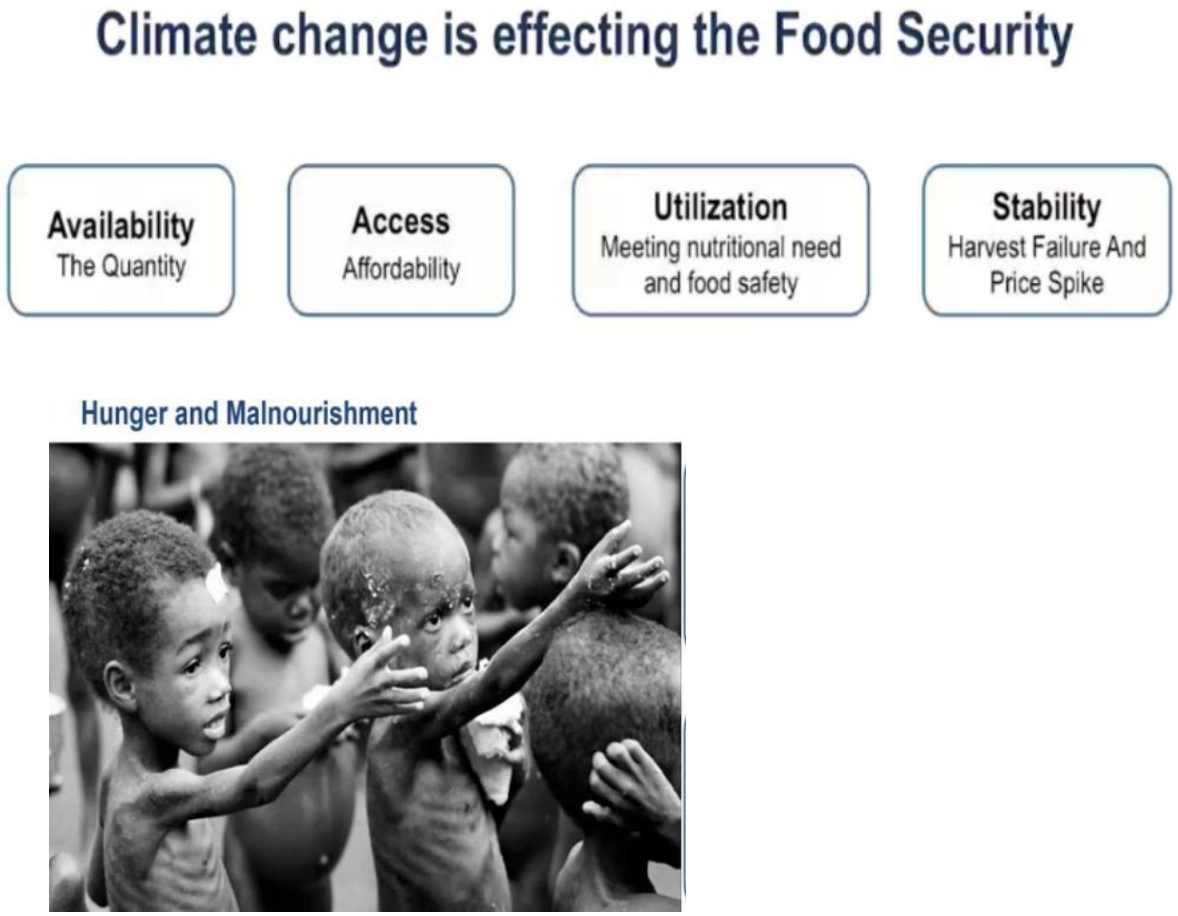
Various drivers and pressures on land resources

- Urbanization
- Climate Change
- Technology and innovation
- Population growth
- Economic development
- Mining
- Solid waste dumping
- Pollution
- Soil erosion

Land-use dynamics

- Change in land-cover
- Agricultural dynamics
- Forest dynamics
- Urban expansion



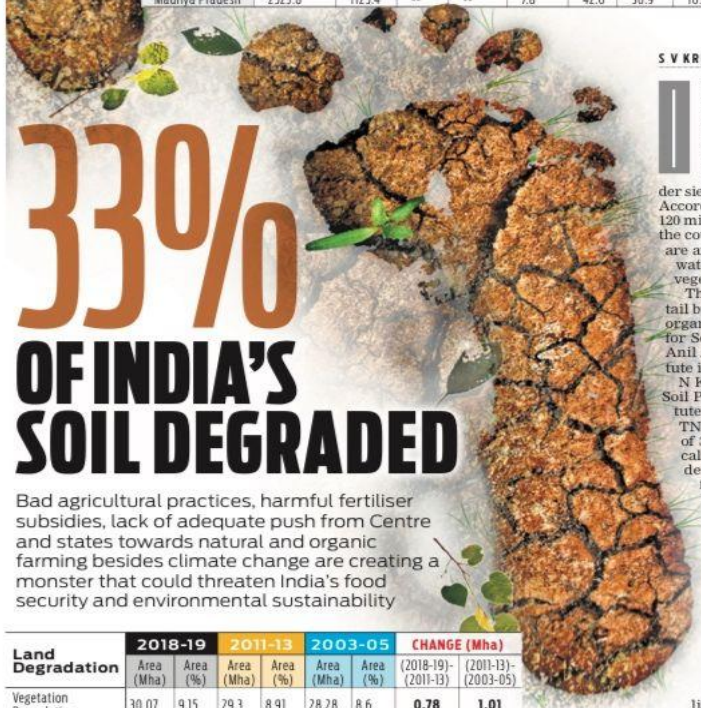
Land degradation; Drought; Food security problems

30 Percent of the country or 97.85 Mha of India's Total Geographic Area during 2018-19 was undergoing land degradation

STATE-WISE DISTRIBUTION (AREA IN '000 HA) OF SOIL DEGRADATION STATUS IN INDIA (2018-19)

STATE	Vegetation Degradation	Water Erosion	Wind Erosion	Salinity	Water Logging	Man-made	Barren/ Rocky	Settlement	Degraded Area*	No Apparent Degradation
Andhra Pradesh	1164.3	789.4	4.0	118.0	132.3	30.2	20.5	66.2	**2378.0**	**13346.2**
Arunachal	120.5	--	--	--	--	--	--	14.4	**200.7**	**8091.7**
Assam	472.0	31.4	--	--	186.7	0.4	--	40.0	**834.5**	**6441.4**
Bihar	242.5	321.2	--	--	106.6	1.0	--	28.2	**746.6**	**8414.7**
Chhattisgarh	1348.1	783.6	--	--	--	52.8	7.2	35.8	**2306.5**	**11033.1**
Delhi	10.0	--	--	--	0.3	--	--	81.2	**91.5**	**55.6**
Goa	138.2	33.9	--	--	9.0	3.4	--	11.9	**194.9**	**167.4**
Gujarat	2319.8	3859.5	1177.1	2645.4	3.4	68.6	33.5	212.7	**10248.1**	**8545.3**
Haryana	41.4	13.6	151.8	27.8	12.5	6.0	--	100.2	**364.2**	**4057.0**
Himachal Pradesh	1790.8	268.3	--	--	--	0.7	--	2.1	**2400.3**	**3117.6**
Jammu & Kashmir	832.8	136.9	--	--	70.2	--	--	22.0	**1129.5**	**4241.0**
Jharkhand	1379.0	4036.8	--	--	--	95.3	--	51.7	**5482.3**	**2411.9**
Karnataka	1712.4	5043.0	2.2	86.7	--	38.8	3.3	116.9	**6959.8**	**11975.5**
Kerala	337.6	--	--	--	12.0	1.8	--	49.5	**422.3**	**3381.2**
Ladakh	1115.5	9.2	1673.3	--	--	--	219.7	--	**7112.0**	**9513.4**
Madhya Pradesh	2523.8	1125.4	--	--	7.8	42.0	30.9	105.0	**3859.7**	**26417.7**
Maharashtra	4884.0	8060.8	--	29.1	--	49.0	497.7	371.2	**14306.0**	**15931.3**
Manipur	575.6	8.1	--	--	5.0	--	--	15.1	**612.6**	**1601.6**
Meghalaya	435.5	53.1	--	--	1.5	0.6	--	9.2	**557.6**	**1683.9**
Mizoram	167.1	8.1	--	--	--	--	--	13.8	**275.8**	**1812.8**
Nagaland	778.4	--	--	--	--	--	--	9.2	**828.9**	**827.3**
Orissa	745.1	4409.4	--	--	36.4	72.9	5.1	49.6	**5359.0**	**9715.5**
Punjab	32.6	14.1	--	--	--	1.6	--	113.0	**168.0**	**4824.2**
Rajasthan	2606.2	2116.3	15197.9	363.8	18.4	81.8	1050.2	139.1	**21237.7**	**12821.7**
Sikkim	74.3	--	--	--	--	--	--	0.7	**84.6**	**624.4**
Tamil Nadu	1385.5	6.4	30.4	9.9	--	18.0	0.5	119.2	**1600.0**	**11287.7**
Telangana	541.1	2854.3	--	86.5	--	41.1	2.0	117.9	**3638.5**	**7633.2**
Tripura	236.4	186.9	--	--	--	--	--	16.4	**447.4**	**593.7**
Uttar Pradesh	413.5	587.0	--	307.6	33.6	9.8	--	218.6	**1549.6**	**22092.5**
Uttarakhand	606.6	11.9	--	--	--	--	--	17.9	**673.9**	**4642.1**
West Bengal	265.3	1329.5	--	--	17.6	22.2	--	122.0	**1784.3**	**6827.1**
TOTAL	**29295.8**	**36098.3**	**18236.7**	**3674.8**	**653.5**	**638.0**	**1870.6**	**2270.8**	**97854.9**	**224129.6**

** Frost Shattering and Mass Movement data of soil degradation are considered in total degraded area | (Source: Space Application Centre, 2021)*



33% OF INDIA'S SOIL DEGRADED

Bad agricultural practices, harmful fertiliser subsidies, lack of adequate push from Centre and states towards natural and organic farming besides climate change are creating a monster that could threaten India's food security and environmental sustainability

Land Degradation	2018-19		2011-13		2003-05		CHANGE (Mha)	
	Area (Mha)	Area (%)	Area (Mha)	Area (%)	Area (Mha)	Area (%)	(2018-19)-(2011-13)	(2011-13)-(2003-05)
Vegetation Degradation	30.07	9.15	29.3	8.91	28.28	8.6	**0.78**	**1.01**
Water Erosion	36.2	11.01	36.1	10.98	35.61	10.83	**0.1**	**0.49**
Wind Erosion	17.94	5.46	18.23	5.55	18.35	5.58	**-0.29**	**-0.11**
Salinity	3.64	1.11	3.67	1.12	4.01	1.22	**-0.03**	**-0.32**
Water Logging	0.81	0.25	0.65	0.2	0.6	0.18	**0.15**	**0.05**
Frost Shattering	3.47	1.05	3.34	1.02	3.11	0.95	**0.12**	**0.23**
Mass Movement	0.94	0.29	0.93	0.28	0.84	0.26	**0.01**	**0.08**
Manmade	0.64	0.19	0.41	0.12	0.37	0.11	**0.23**	**0.04**
Barren/Rocky	1.87	0.57	1.89	0.57	1.88	0.57	**-0.02**	**0**
Settlement	2.27	0.69	1.88	0.57	1.48	0.45	**0.39**	**0.4**
Total degraded Area	97.85	29.77	96.4	29.32	94.53	28.76	**1.45**	**1.87**
No Apparent Degradation	225.06	68.46	226.73	68.97	228.68	69.57	**-1.67**	**-1.95**

TEMPORAL CHANGE IN LAND DEGRADATION

The table shows the category-wise change in land degradation over the years. Data was obtained from the Advanced Wide Field Sensor onboard ISRO's Resourcesat

S V KRISHNA CHAITANYA @ Rajasthan

INDIA is witnessing an alarming rise in soil degradation, threatening its agricultural productivity, food security, and environmental sustainability. Soil, a vital resource supporting the livelihoods of millions of farmers and maintaining ecosystem balance, is under siege from various forms of degradation. According to recent estimates, nearly 115 to 120 million hectares (Mha)—roughly 33% of the country's total geographic area (TGA)—are affected by soil degradation, including water erosion, wind erosion, salinity, and vegetation loss.

This growing issue was discussed in detail by all stakeholders at the Climate Week organised by the New-Delhi based Centre for Science and Environment (CSE) at its Anil Agarwal Environment Training Institute in Nimli, Rajasthan.

N K Lenka, principal scientist and head, Soil Physics Division of ICAR-Indian Institute of Soil Science, Madhya Pradesh told TNIE on the sidelines of the event: "Out of 360 million hectares of total geographical area, 115 to 120 million hectares are degraded. This data was harmonised from different sources, including ISRO's Satellite Application Centre (SAC), National Bureau of Soil Survey and Institute of Soil Science. The parameters to categorise soil degradation are chemical and physical. For instance, in the case of chemical degradation, soil would have become acidic. Even if farmers apply loads of urea, the soil will give no produce. Our trials show in some locations, the soil quality came down by 10 times," he said.

The latest Desertification and Land Degradation Atlas of India published by the SAC, which formed the basis for the assessment, reveals that water erosion is the most significant contributor, affecting 11.01% of India's land. Other major processes include vegetation degradation (9.15%) and wind erosion (5.46%). These processes, compounded by deforestation, poor agricultural practices, and climate change, are particularly prevalent in semi-arid and dry sub-humid regions of the country.

The atlas also highlights the growing impact of desertification, with 83.69 Mha of dryland classified as undergoing this process, which has seen a cumulative increase of over 1 million hectares since 2003-05.

In addition to natural processes, human-induced activities, such as mining, overgrazing, and industrial pollution have further exacerbated the problem. States like Rajasthan, Maharashtra, Gujarat, and Telangana are among the worst affected, with significant portions of their land showing severe degradation. Rajasthan alone, for example, has over 21 million hectares classified as degraded, largely due to wind erosion in its arid and semi-arid zones.

Soil degradation has far-reaching consequences on India's agricultural sector, which contributes significantly to the national economy and provides employment to a large percentage of the population. The loss of topsoil and nutrients due to erosion has reduced the land's ability to sustain crops, leading to lower yields and increased vulnerability to extreme weather events.

Sunita Narain, Director General of CSE told this newspaper: "Depletion in soil quality means depletion of carbon content and increased need for fertilisers. This adds to Greenhouse Gases emissions. The way ahead is to increase soil carbon through increased use of biomass. There can be many options to do this - from natural farming to increased use of nitrogen fixing crops and increased use of organic manure. This is a win-win as it will add fertility, reduce subsidies for fertilisers and emissions."

Soil degradation in Tamil Nadu

Tamil Nadu, a state heavily reliant on agriculture, is also witnessing significant soil degradation. According to the Desertification and Land Degradation Atlas, the state had 1.60 million hectares affected by various forms of degradation as of 2018-19. Water erosion, particularly in the plains and riverine regions, accounts for a substantial portion of the degradation, along with localised salinity issues in coastal areas.

In the hilly regions of Tamil Nadu, land degradation manifests through mass movements, where steep slopes and heavy rainfall result in soil loss and landslides. Additionally, unsustainable agricultural practices, such as excessive use of chemical fertilizers and improper irrigation methods, have contributed to soil hardening and reduced fertility in many parts of the state.

Ongoing efforts

The government, under its commitment to the United Nations Convention to Combat Desertification (UNCCD), has set an ambitious target of achieving land degradation neutrality by 2030. This includes the restoration of 26 million hectares of degraded land. Various states have launched programmes to promote sustainable land management. For instance, Chief Minister M K Stalin in June launched a soil health scheme with a budgetary allocation of ₹206 crore. A key part of the plan is to keep the land fertile by using green manure. A start-up fund of ₹20 crore has been set aside just for this. The project plans to spread green manure seeds over about 2,00,000 acres starting in 2024-25. This will directly help over 2,00,000 farmers.

Maharashtra and Gujarat have also initiated efforts to improve soil health byencouraging organic farming practices, reducing chemical inputs, and implementing soil conservation techniques.

Challenges

While these efforts are commendable, the path to reversing soil degradation is fraught with challenges. Limited financial resources, lack of awareness among farmers, and the pressure for short-term agricultural yields over long-term sustainability have hindered the success of land restoration programmes. The adoption of sustainable farming practices, such as agroforestry, crop rotation, and conservation tillage, remains low in many regions, despite their proven benefits in reducing soil erosion and enhancing soil fertility.

Moreover, the changing climate poses an additional threat, with increased frequency of extreme weather events like droughts and floods further accelerating the soil degradation processes. This calls for a holistic approach to land management that integrates climate resilience with sustainable agricultural practices.

T Vijaykumar, Executive Vice Chairperson, Rythu Sadhikara Samstha, Andhra Pradesh, said: "Our soils are currently non-porous, non-permeable. The soil organic matter has dipped so badly. Ideally, 50% should be air pockets so that a healthy water holding capacity can be maintained and carbon can be sequentiated. Crop diversity is an important aspect. There is no shortage of nutrients in the soil. What is required is soil biology to convert these nutrients and make them into the bio available form like nitrogen, phosphorus and potassium."

Gagnesh Sharma, director, National Centre for Organic and Natural Farming, Uttar Pradesh said: "Under the National Mission for Sustainable Agriculture, the government is targeting 5-10% of the degraded area. Let's see and evaluate the success rate. The Ministry of Agriculture is sending teams to states like Andhra Pradesh and a few others where some farmers are practicing natural and organic farming."

State of global environment: Water

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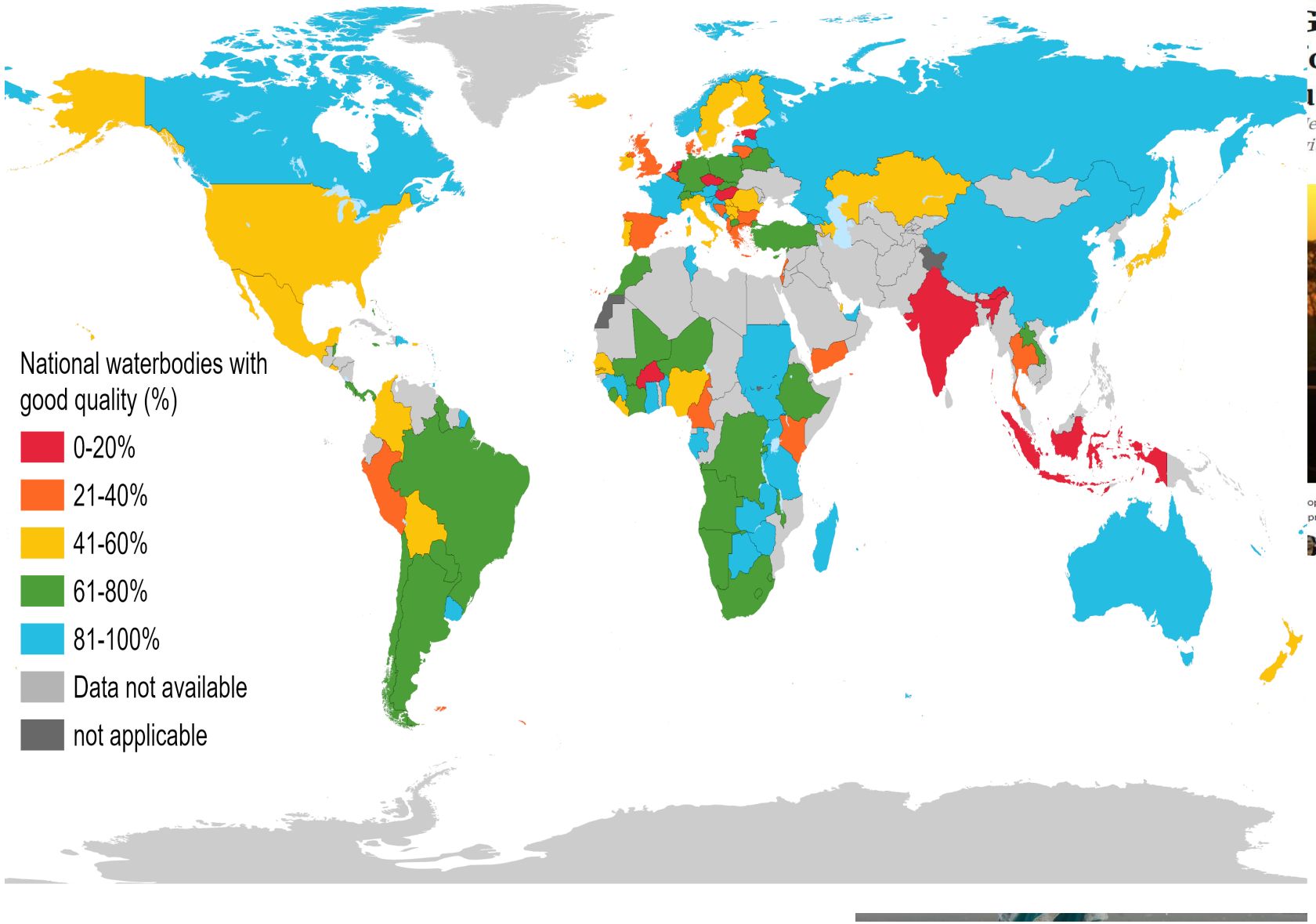

ater

Groundwater in 12 Indian states found to be contaminated with uranium

early 29%, or about 3 in every 10 wells tested in Punjab, is contaminated ith uranium

ople dependent groundwater containing the element are at a higher risk for impaired renal function and kidney disease. presentational photo: iStock.

Kiran Pandey

Seawater intrusion seen north of Chennai

Groundwater quality between Ennore and Ponneri badly hit, finds Anna University study

Updated - December 31, 2019 11:23 am IST - CHENNAI

K. LAKSHMI

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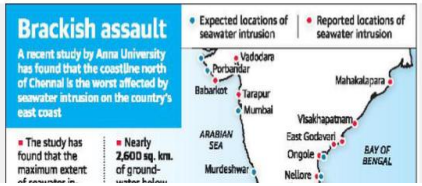
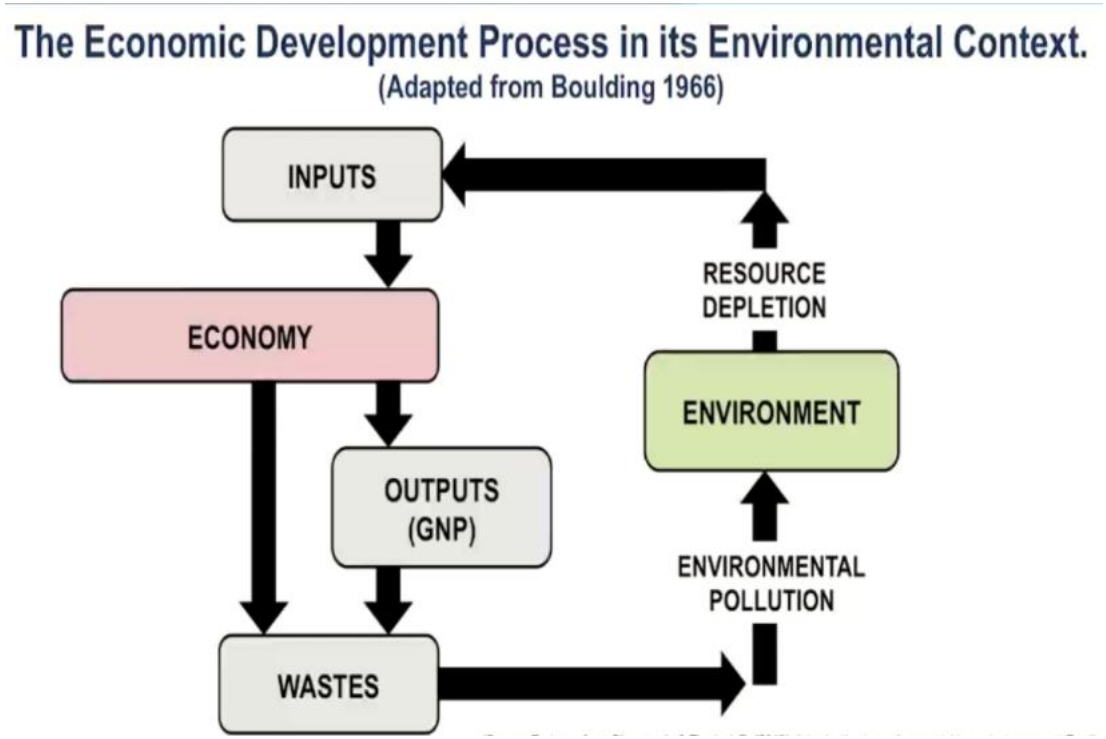


Overall state of global environment



Bouldings concept,

- **Natural environment→ sink for the waste and the s for the resources,**
- So, environmental pollution and the depletion of resources are invariably always the ancillaries to economic development.

Environmental Drivers

Climate Change

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- independent driver of environmental change
- Carbon→ Fuels→ Economics
- Carbon→ Emission→ Environment
- Risk factors
  - Water and Food Security
  - Air quality
  - Disasters
  - Deforestation, desertification
  - Loss of biodiversity

Transformed the earth's natural system exceeding its capacity and disrupting its self-regulatory mechanism

Saudi Arabian Desert Sees Snowfall For The First Time In History, Check Photos And Videos

This unprecedented phenomenon follows intense rain and hail storms that swept across the Kingdom.

Edited by: Ritu Singh | World News | Nov 07, 2024 11:54 am IST

Read Time: 2 mins

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Image tweeted by @mededov_nurlan

Saudi Arabia's weather department has issued severe weather warnings for the coming days.

Anthropocentrism	Biocentrism	Ecocentrism
Anthropocentrism is the belief that considers human beings are the most important entity in the universe or earth	Biocentrism is the belief that all living beings have an inherent value	Ecocentrism is the belief that considers ecosystems including both living and non-living components have inherent value
	HUMAN BEINGS	
Humans have greater intrinsic value than other species	Humans do not have a more inherent value than other species	Humans do not have more inherent value than other things
	SYSTEM	
Human centered	Centered on all living organisms	Nature or ecosystem centered

One Earth and One Health

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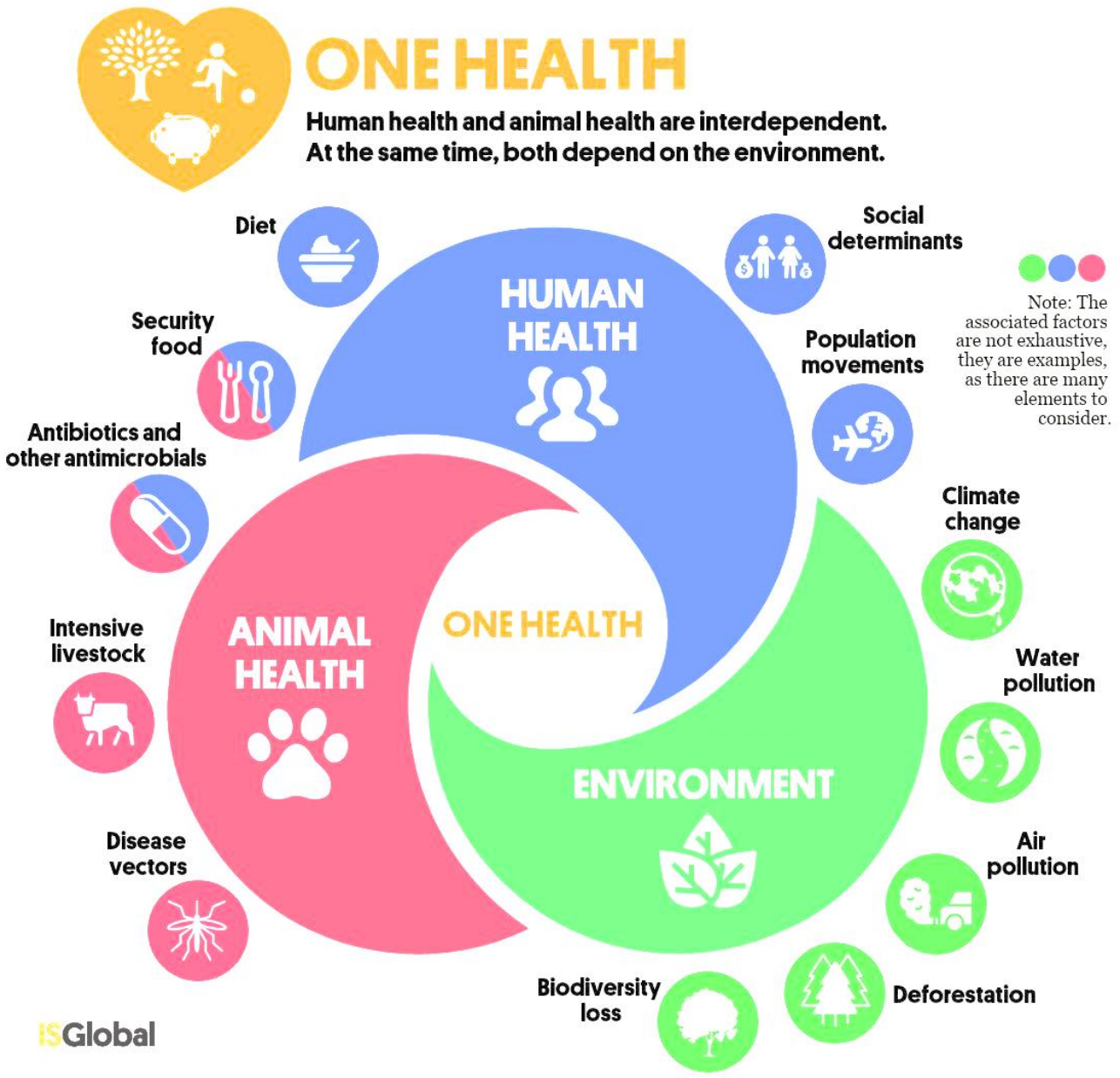
Protecting Earth

Protecting Humanity



World Sustainable Development

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Sustainability

Circular economy

Development v/s Environment

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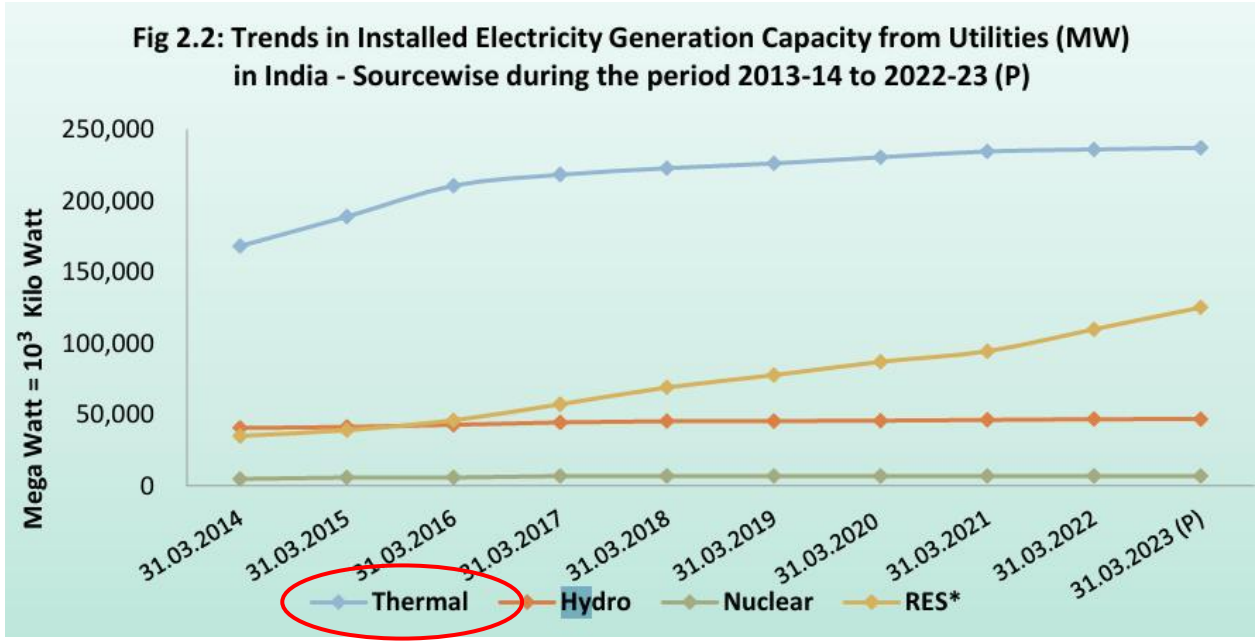
Electricity-→ Inevitable!!!



As per the Indian Bureau of Mines, Jharkhand has 12 coalfields. Among them, Jharia, North Karanpura, and Rajmahal, comprises of 23.1%, 22%, and 20.7% of the coal reserves, respectively. The Indian Minerals Yearbook (2019) states that, there are total 120 coal mines in Jharkhand out of 455 coal mines in India (26% of mines in India). As per the available district specific data, of the 114 mines in Jharkhand, 27 are Underground (UG) mines, 77 are Open Cast (OC) mines, and 10 are mixed mines.

Premium

Is Jharkhand's tribal population 'shrinking', as BJP claims? Yes, since before Independence, out-migration major factor

Even before 1947, reasons identified behind the region's declining tribal population included low birth and high death rates, in-migration of non-tribals (for mining jobs) combined with out-migration of tribals, as natural resources they were dependent on dwindled.

Written by Anjishnu Das
New Delhi | Updated: November 11, 2024 04:47 IST

NewsGuard

5 min read

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Development v/s Environment

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Chennai's second airport at Parandur to be built in four phases

The construction of the first phase will begin in January 2026 and end by December 2028 and following this, the other phases will be subsequently taken up, with the final phase winding up by December 2046

February 28, 2024 10:55 pm | Updated 10:55 pm IST – CHENNAI

THE HINDU BUREAU

COMMents SHARE

Villagers express grave concern over Parandur airport project in the light of cyclone Fengal

Published – December 03, 2024 09:33 pm IST – CHENNAI

SUNITHA SEKAR

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A waterbody in Egnapuram village will be affected if the airport project takes off, says a villager. | Photo Credit: VELANKANNI RAJ B

4000 acres of land: 2500 agricultural lands;
1500 acres: water bodies
→ 20000 Crores→ 100 million passengers/y. ,

Development v/s Environment

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What's the row over tungsten mining in Madurai?

Premium

Who had got the rights? Why have there been protests? What's the Tamil Nadu government's stand?

Updated - December 09, 2024 01:21 pm IST

C. PALANIVEL RAJAN

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The hillocks in Arittapatti village of Madurai district. File | Photo Credit: G. Moorthy

Tamil Nadu passes resolution opposing Centre-approved tungsten mining in Madurai

Story by Pramod Madhav • 18h • 2 min read

Tamil Nadu passes resolution opposing Centre-approved tungsten mining in Madurai

The Tamil Nadu Assembly witnessed a heated debate over the Centre's approval to Vedanta group to mine tungsten in Madurai district before passing a resolution opposing the mining project. The resolution, introduced by Water Resources Minister Durai Murugan, came in the wake of protests by residents of Arittapatti.

Environmental Impact Assessment (EIA)

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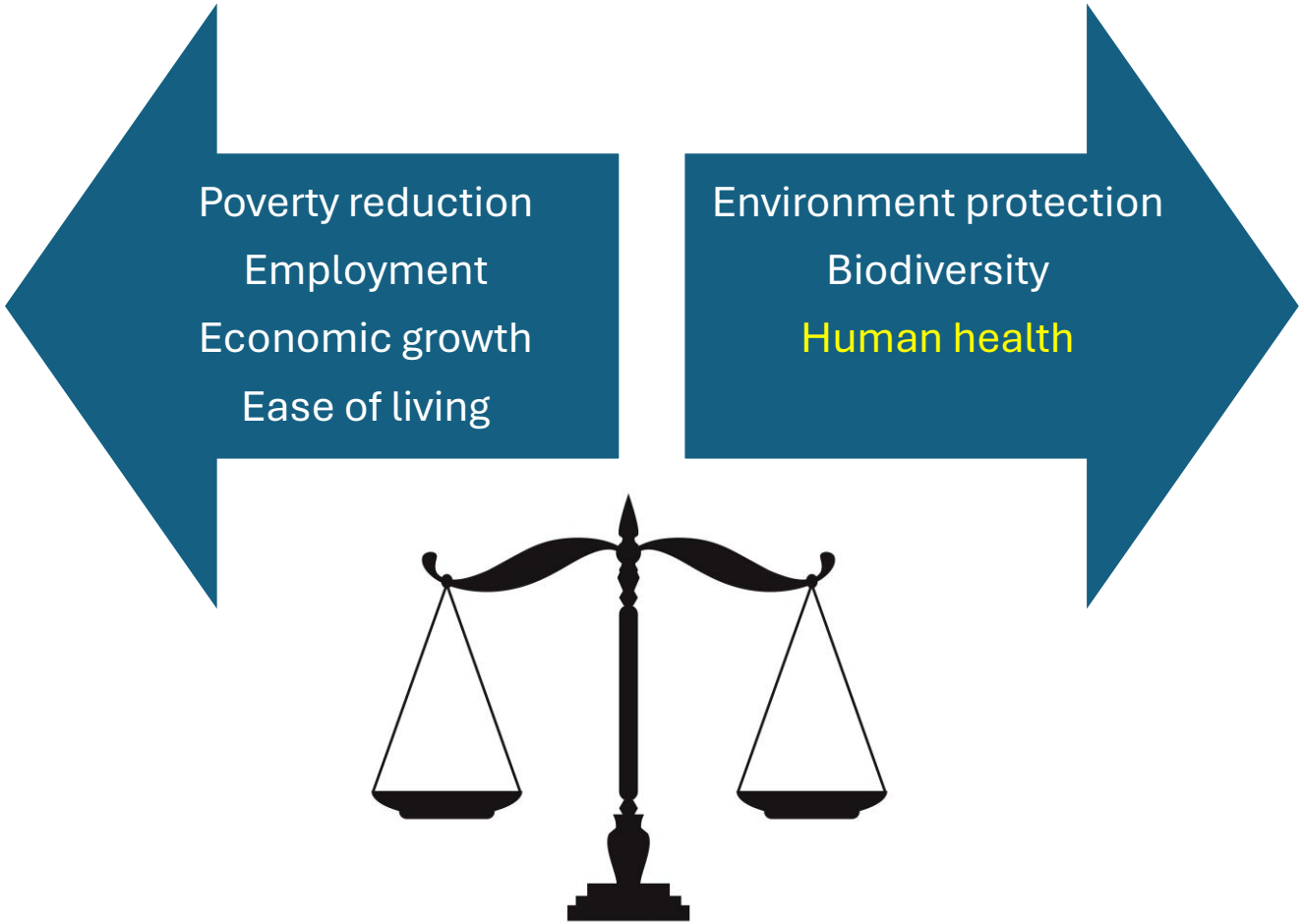
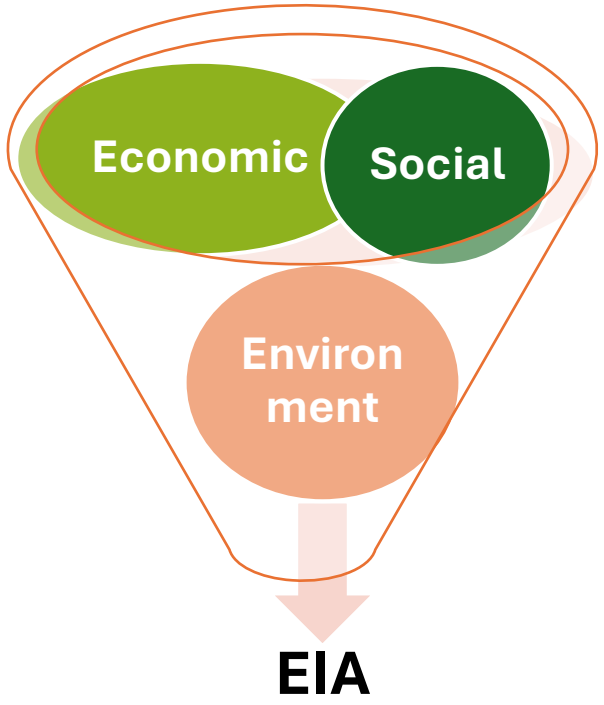
Development **V/s** **Environment**





EIA

Development and Environment

EIA: The Middle path!!

Environmental Protection Act 1986

Evolution of EIA

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Love Canal Project

William T Love (1844-1889)

1890- Constructed a canal connecting Niagra River to Ontario Lake- Hydroelectricity power generation

1892- Restricted removal of water from Niagra river; project was abandoned

1920- The Canal was turned into swimming pool & parks

1940- US Army turned the canal into toxic waste dumpsite

1942- Hooker Chemical & Plastic company started dumping the waste in the canal- 10 years- 21800 tons of chemical waste were dumped; built clay walls and sold to the Niagara Falls board of Education for 1 USD for school construction

Evolution of EIA

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1968- Strange problems; skin irritations, cancer; fish in lakes contaminated with mercury: Heavy rain and snowfalls spread contamination (DDT pesticide)

1970- Reporter Michael Brown did a door-to-door survey regarding risks.

Enlarged feet, hands, birth defects, abnormal miscarriage, nervous disorder, mental retardation

1978- Residents evacuated during spring

Creation of National Environmental Protection Act, (NEPA) US, 1969

Timeline of EIA

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1960 — EIA in decision

EIA as a part of rational decision making process
Technnical evaluation mandated

1969

EIA was made legislation in US in National Environmental Policy ACT

US NEPA

1980 — World bank: EIA

World bank adopted EIA for major development projects
UNEP adopt EIA studies

1991

To consider transboundary effects in EIA studies

ESPOO convention

1992 — Rio declaration

UN declares EIA as a national decision making instrument

1994

Union Ministry of Environment and forests under EPA 1986 promulgated EIA notificaiton

India

1997 — Public hearing: EIA

Public hearing made compulsory before impact assessment was finalised

2006

Ministry of environment, forests, and climate change notified new EIA legislation

India

2020 — New EIA draft

Draft 2020

What is EIA?

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"The process of identifying, predicting, evaluating and mitigating the biophysical, social, and other relevant impacts of development proposals prior to major decisions being taken and commitments made."

EIA in simple words: "LOOK before you LEAP!"

Significance of EIA

- Assess the impacts on the environment that are likely to result from the development process.
- A process gives assessment outputs and **facilitates decision-making.**
- **Early identification of environmental impacts**; predicted impacts can be mitigated before they occur.
- Help to adopt **sustainable environmental management practices**.

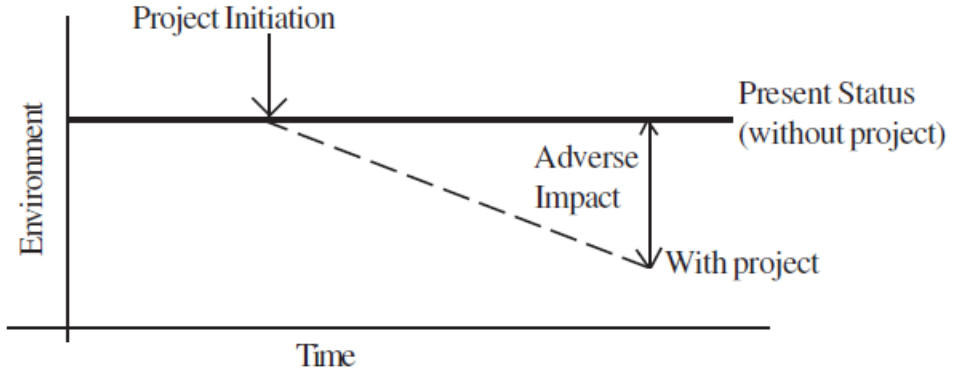


Fig. 24.1: (a) Anticipated environmental impact of developmental project.

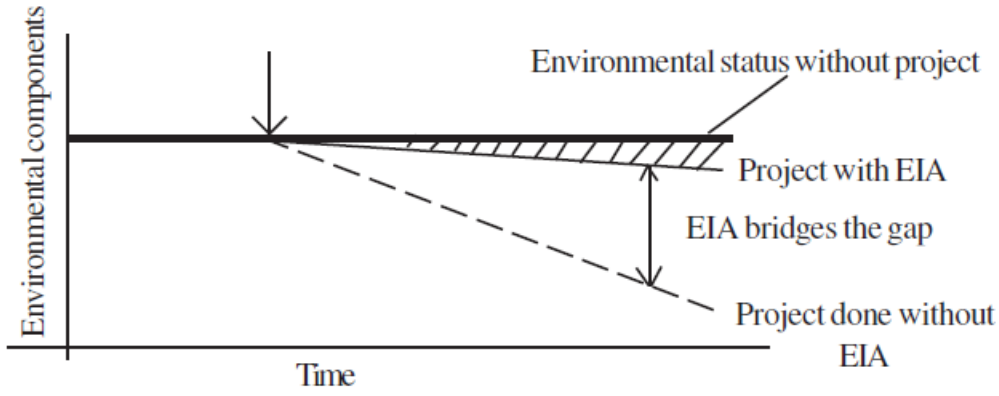


Fig. 24.1: (b) Environmental impact rectification after EIA

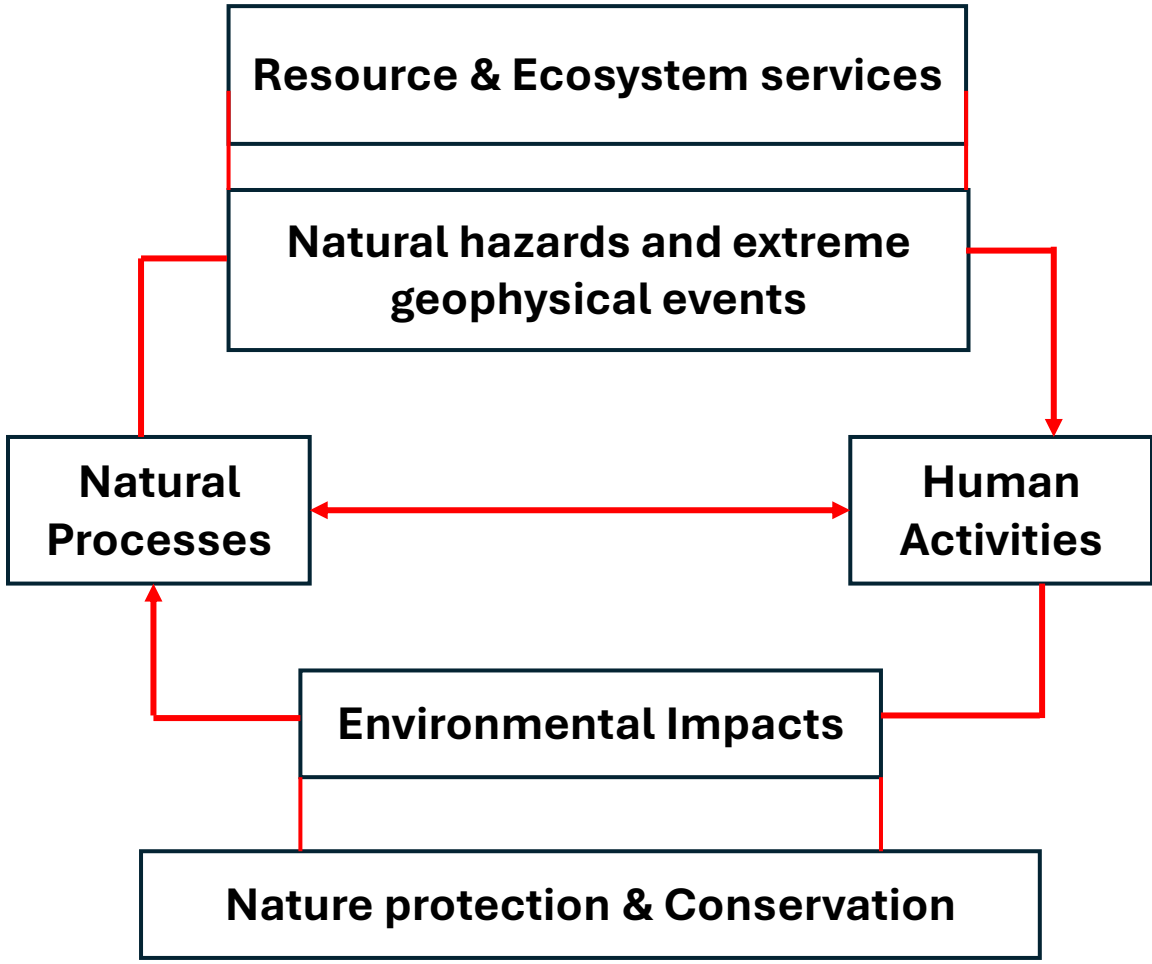
Core values and Components of EIA

- **Integrity:** Should be fair, unbiased and balanced
- **Utility:** Provide credible and balanced information for decision making
- **Sustainability:** Should result in decisions that protecting the environment

The important aspects of EIA are:

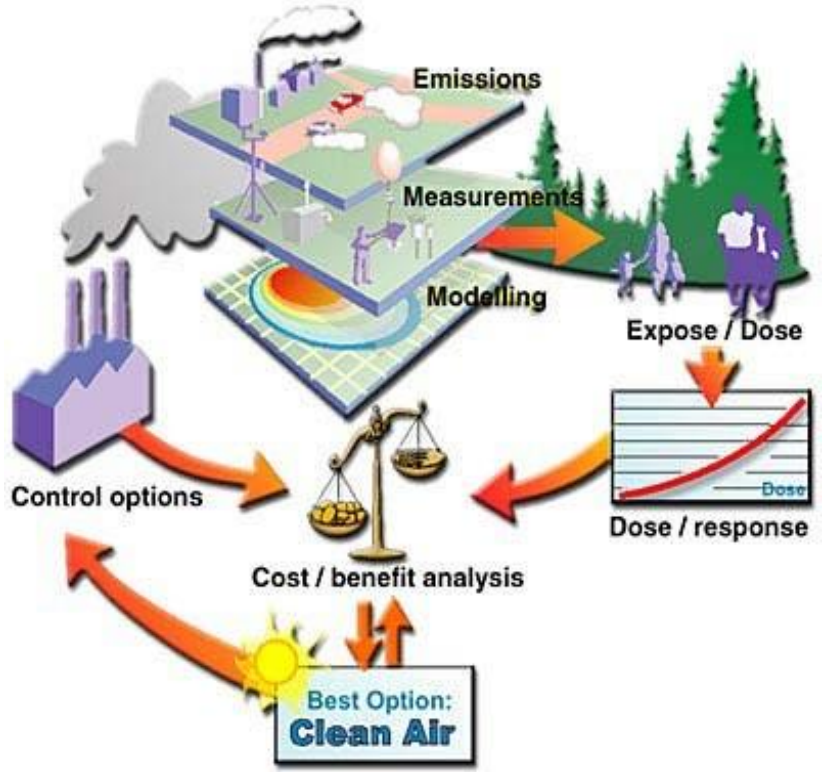
- risk assessment
- environmental management and
- post product monitoring

Components of EIA



Purpose of EIA

1. Serve as a primary environmental tool with clear provisions.
2. Apply consistently to all proposals with potential environmental impacts: short-term, long-term, small-scale, and large-scale effects.
3. Consider sustainable aspects such as the capacity for assimilation, carrying capacity, and biodiversity protection.



4. Lay down a flexible approach with and provides for public involvement.
5. Have built a mechanism of follow-up and feedback for comply into mandatory requirements.
6. Include mechanisms for monitoring, auditing, and evaluation after completion of the project.

Types of EIA

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Based on time frame

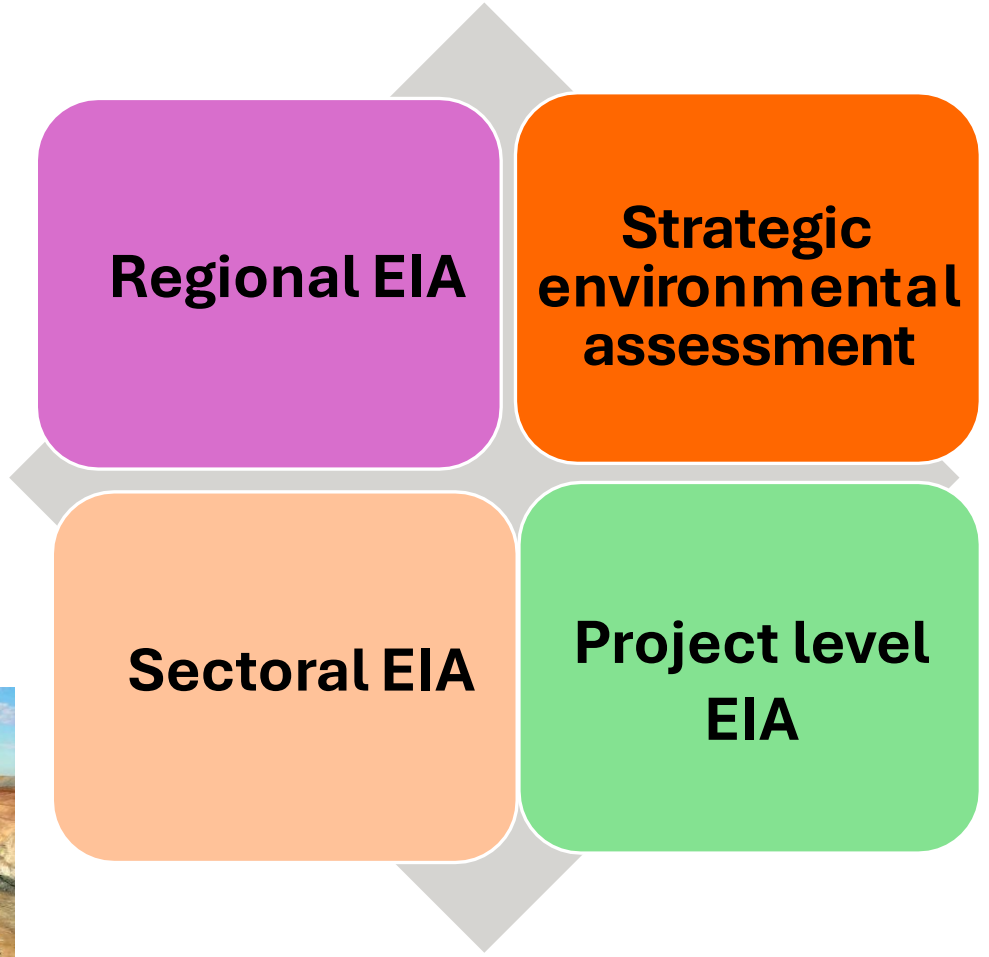
1. Rapid EIA:

- Carried out for projects cause limited adverse impacts
- Information collected for only one season (Except monsoon)
- Timeframe- 3 months

2. Comprehensive EIA:

- Carried out for a project causing adverse impacts
- Collection of data for 3 seasons
- Time frame- year

Based on objectives



Types of EIA

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Based on objectives

1. Regional EIA:

- Regional planning; integrates environmental and economic concerns of a particular region (*Dimension of several kms*)
- Economic-cum- Environmental development planning in a region
- Economic management of renewable natural resources without compromising the environment (Eg: Projects in a valley→ *Lithium mining in Jammu Kashmir region*)

2. Sectoral EIA:

- Specific sectors: *Mining, power plants, townships, airports, nuclear power plants, thermal power*
- Addressing specific environmental problems
- Environment, social and economic impact of the same type of sector is similar; better planning and decision-making
- MOEFCC – 37 EIA manuals on major sectors, EIA, 2006

Types of EIA

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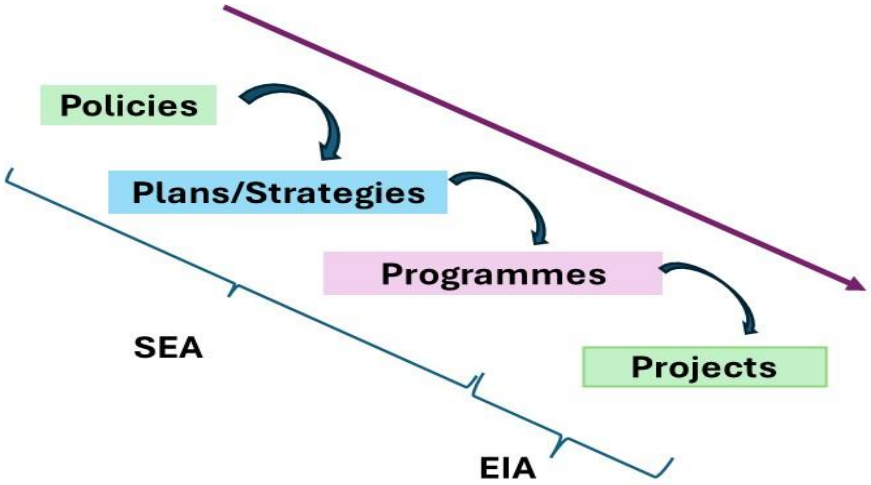
3. Project level EIA:

- Developmental activities considered in isolation
- Impact assessment specifically for activities proposed in a project
- EIA in section *of a highway project* or small project

4. Strategic environmental assessment (SEA)

- Analysis of environmental effects of developmental policies, plans, programmes
- Assist in decision-making by improvement over EIA
- Represents proactive approach for integrating socioeconomic values with environmentally viable development for higher levels of decision making



- No guidelines at present
- But *needed* due to rapid increase in infrastructure and developmental activities
- Systematic analysis of environmental affects of development of policies, plans, programes, and other *proposed strategic actions*

Comparison of EIA and SEA

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Environment Impact assessment	Strategic environment assessment
Takes place at end of decision-making cycle	Takes place of earlier stages of decision-making cycle
Reactive to development proposal	Pro-active to development proposals
Identifies specific impacts on the environment	Access effects of a policy, plan or programs on the environment or effect of the environment and development needs and opportunities
Address specific project	Addresses areas, regions or sections of development
Emphasis on mitigating and minimizing impacts	Emphasis on meeting environmental objectives, maintaining environmental quality
Narrow perspective and a high level or detail	Broad perspective and **lower level of detail to provide a vision and overall framework**
Well-defined process, clear beginning, and end	Multi-stage process, **overlapping components, policy levels, continuing and iterative**

Impacts in EIA

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Environmental Burden
(Discharge to water, Emission to air, Waste to land)

Contribution from other activities in the area under assessment

Ecological Impact

Ecological functions
Biodiversity
Habitats
Endangered species
Disease vectors
Agriculture

Social Impact

Health
Safety
Recreation
Culture heritage
Perceptions

Economic Impact

Revenue/costs
Internal rate of return
Employment
Community Welfare
Social equity
National economy

Classification of Environmental Impacts

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Table 2.1 Typology of Environmental Impacts

Category	*Impacts*
Type	Physical, Chemical, Biological, Health, Social, Economic
Nature	Direct, Indirect, Cumulative, Beneficial (Positive), Harmful (Negative)
Magnitude or Severity	High, Moderate, Low
Extent/Location	Local, Regional, Transboundary, Global
Timing	Immediate, Delayed, During Pre-Construction, Construction, Operation, and Post-Operation phases
Duration	Temporary, Permanent, Short-Term, Long-Term, Intermittent, Continuous
Likelihood	Probability—Low, Moderate or High, Uncertain, Unknown
Reversibility	Reversible, Irreversible
Spread	Spatial, Temporal
Significance	Significant, Insignificant

Impacts: Varies with the receptors

Classification of Environmental Impacts

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Activities	Impacts			
	Positive	**Negative**		
Opening of an automobile industry (e.g. Ford)	Job creation; economy and local business growth	Pollution in water, air and land		
Metro rail projects	**Positive**	**Negative**	**Short-term**	**Long-term**
	Infrastructure development	Widening; land acquisition	Congestion on roads during construction	Reduced GHG emissions; global warming
Dam construction	**Positive**	**Negative**	**Repairable**	**Irreparable**
	Water storage; hydro-electric power generation	Water conflicts; ecosystem disturbance	Deforestation → Afforestation; social forestry	Ecosystem disturbances; livelihood of forest community; migration of tribes

Classification of Environmental Impacts

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Activities	Impacts			
	Positive	**Negative**	**Spatial**	**Temporal**
Tungsten Mining /Lithium Mining proposed	Economy growth; lead exporter	Ecosystem disturbance; pollution	Affecting in and around regions	Mine tailing effluents affect the water bodies; ground water
	Direct	**Indirect**	**Temporary**	**Permanent**
	Exposure of toxicants to workers; inhabitants	Transfer of pollutants from mother to foetus	Immediate health effects	Chronic disease development due to toxicants from mine tailing
	Local	**Regional**	**National**	**Irreversible or irreparable impacts**
	Disturbance of the local surroundings	Ecosystem disturbance	Growth due to export	Disturbing the water bodies

Participants of EIA

The six main players are:

(i) Those who **propose the project**

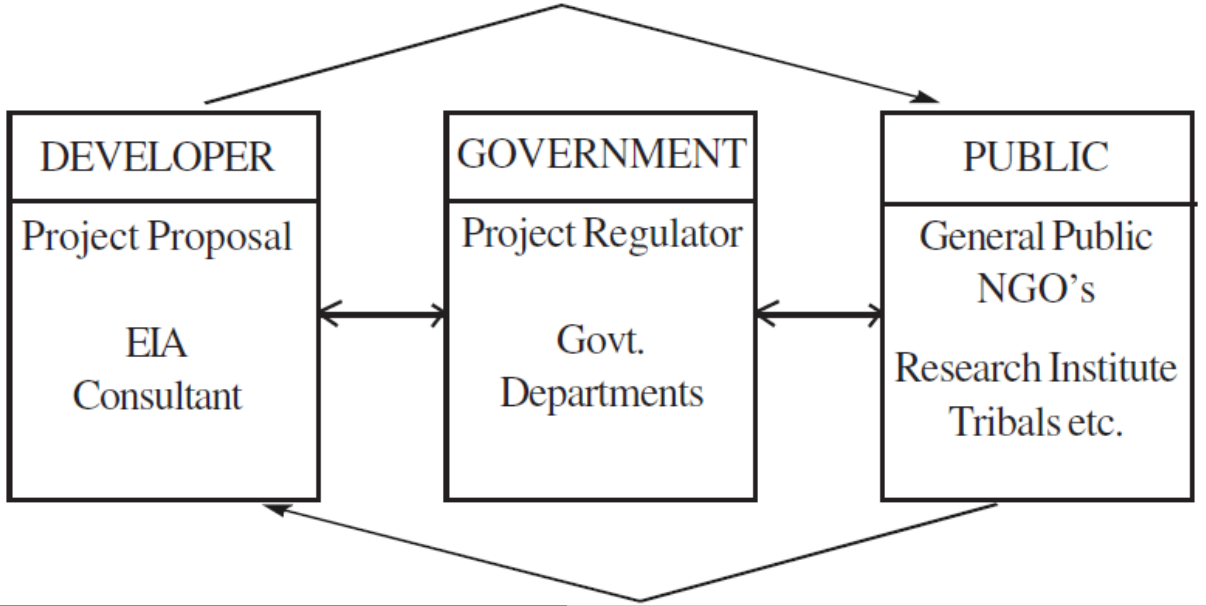
(ii) **The environmental consultant** who prepares EIA on behalf of the project proponent.

(iii) Pollution Control Board (State or National).

(iv) The **public** has the right to express their opinion.

(v) The **Impact Assessment Agency**.

(vi) Regional Centre of the MOEF



Forms of Impact Assessment

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Based on the type of project, the EIA study will include any of the following

- **Social Impact assessment:** Pre-project
- **Risk assessment:** Pre and Post project
- **Life cycle analysis (LCA):** developmental stage of product
- **Strategic environmental assessment:** at the policy and planning level
- **Technology assessment:** developmental stage of product
- **Cost Benefit assessment:** after production
- Energy analysis
- Health impact assessment
- Species impact assessment
- Cumulative impact assessment
- Integrated impact assessment

Benefits and flaws of EIA

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Benefits	Flaws
Provides systematic method of impact assessment	**Time consuming**
Estimates the cost/Benefit trade-off of alternate actions	Costly
Facilitates the public participation	Agitation; less **public participation** in implementation
Provides effective mechanism for coordination, environmental mitigation, negotiations, feedback	**Unavailability of reliable data** in developing countries
Top-level decision making	Too focused to scientific analysis
Achieves balance between impact of developments and environmental concerns	**Compliance monitoring after EIA is seldom carried out**

How to carry out EIA?

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Major steps:

1. **Identification**
2. **Predication and estimation**: Activities over the entire life cycle
3. **Assessment or evaluation**
   - Comparing predicted environmental conditions with existing values of environmental parameters under “no project”
   - Permissible values of such parameters
   - Evaluating the extent to which resultant environmental conditions are acceptable
4. **Public consultation**
5. **Decision making**

Stages of EIA Process

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Steps for EIA (Eleven steps)

1. Screening

* Determines whether a proposed project requires EIA or not

2. Scoping

* Identify the key impacts and issues that need further investigation.
* Defines the boundary and time limit of the study.

3. Baseline data

* Collection of existing data.

4. Impact identification

5. Prediction

6. Evaluation

* Predicts likely environmental and social impact of the proposed project and evaluates the significance

Phase 1

Phase 2

Stages of EIA Process

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Steps for EIA (Eleven steps)

7. Mitigation

* EIA recommends action to reduce and avoid potential environmental consequences of development activities.

8. EIA preparation

*This stage presents the result of EIA in the form of a report to the decision-making body and other interested parties.

*It examines the adequacy and effectiveness of the EIA report and provides the information necessary for decision-making.

Phase 2

9. Public Consultation

Phase 3

10.Review/Appraisal by EIA authority

*It decides whether the project is rejected, approved or needs further change.

11. Environment audit.

* Post-monitoring: This stage comes into play once the *project is commissioned*. It checks to ensure that the impacts of the project do not exceed the legal standards and that the mitigation measures are implemented in the manner described in the EIA report.

Phase 4

EIA Process

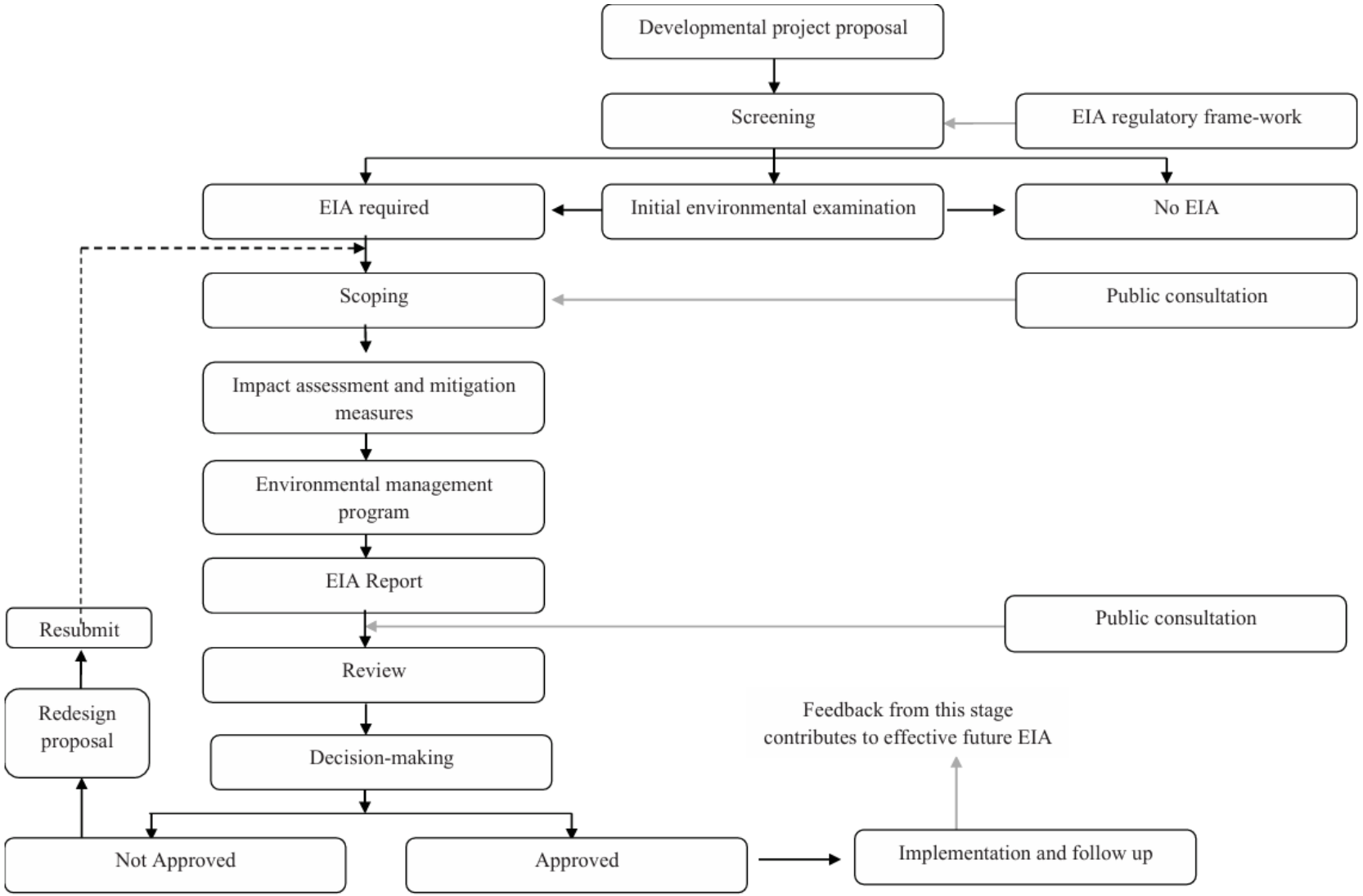

Fig. 2.1 Generalized flow chart of an EIA process

(Modified from UNEP, 2002)