ENVIRONMENT

Dr. V. Sai Saraswathi.,
VIT University

defined

as the total sum of water, air, and land

Tradition:
Yogiraj Vethathiri Maharishi

Voice:
Pradheep Kumar Challiyil

Relaxation and Pancha Bhuta Meditation

Music:
Sampanna Somasundaran
and
Bharat Jayaraman

Environment

- Environment is derived from the french word “ENVIRONNER”.
- Environmental protection act: “1986”.

Theme
English
Family Studies
Science
Drama
Geography
Physical Education
Math
Design & Technology
History
Music

Scope of environmental studies

- Natural resources
- Ecology and biodiversity
- Environmental pollution
- Social issues
- Human population
- Other issuses.

several career option

R & D

Green advocacy

Green Marketing

Green media

Environmental Consultancy

Environmental Calendar

- World E. Day 5th june
- Earth day apr.22
- Anti-tobacco day: may 31`
- Forest day: mar. 21
- Biodiversity day: may 22

Eco mark symbol consumer awareness

NOBEL PRIZE

- Kenyan environmentalist: wangari maathai
- Green belt movement: planted 30 million trees.
- Slogan: “when we plant new trees, we plant the seeds of peace”

- What’s the use of a beautiful house if you don’t have a decent planet to put it on?

THINK GLOBALLY
ACT
LOCALLY

Key Environmental Issues and Sustainable Living

By
Dr. V. Sai Saraswathi., M. Pharma., Ph. D.,
Asst. Prof. (Sr.)
School of Advanced Sciences
VIT University
Vellore- 632014

Healthy - Dec 2014
Dying - Feb 2015
Dead - Aug 2015

What are Environmental Issues?

- Created due to human activities and cause harm to the environment.

Population Explosion

Population Growth and its Variation

Living style change

Major Issues:-

Deforestation

Desertification

The transformation of some landscapes into desert areas when the soil becomes dry and poor is called **desertification**

Habitat loss occurs when natural areas are destroyed to make room for housing or industry.

Excessive development, hunting, fires and other actions cause **extinction of animals.**

Air Pollution

Water Pollution

Loss of biodiversity

Over Fishing

Issues In India

- India has made one of the fastest progress in the world, in addressing its environmental. Still, India has a long way to go to reach environmental quality similar to those enjoyed in developed economies.
- Pollution remains a major challenge and opportunity for India.
- All forms of pollution – air, land, water – are prominently found in India.

Mumbai Flood- 2018

Floods are a significant environmental issue for India. It causes soil erosion, destruction of wetlands and wide migration of solid wastes.

India is recognized as has having major issues with water pollution, predominately due to untreated sewage. Rivers such as the Ganges, the Yamuna and Mithi Rivers, all flowing through highly populated areas, are all heavily polluted. Water supply and sanitation continue to be inadequate, despite long-standing efforts by the various levels of government and communities at improving coverage.

Plastic Pollution

Nuclear pollution

Mining

Chuquicamata, the largest open pit copper mine in the world, Chile

Other issues

- Acid Rain
- Over harvesting of fishes
- Urban Sprawl
- Waste generation
- GM Crops

All the above factor leads to Climate Change

Climate Change

Global warming

This image is of the Easton Glacier on Mount Baker in the North Cascades of Washington taken in 2003. It shows the terminus position of the glacier in 1985 as well.

Biodiversity Depletion
• Habitat destruction
• Habitat degradation
• Extinction
Air Pollution
• Global climate change
• Stratospheric ozone depletion
• Urban air pollution
• Acid deposition
• Outdoor pollutants
• Indoor pollutants
• Noise
Major Environmental Problems
Food Supply Problems
• Overgrazing
• Farmland loss and degradation
• Wetlands loss and degradation
• Overfishing
• Coastal pollution
• Soil erosion
• Soil salinization
• Soil waterlogging
• Water shortages
• Groundwater depletion
• Loss of biodiversity
• Poor nutrition
Water Pollution
• Sediment
• Nutrient overload
• Toxic chemicals
• Infectious agents
• Oxygen depletion
• Pesticides
• Oil spills
• Excess heat
Waste Production
• Solid waste
• Hazardous waste

THANK YOU

Environmental Problems

Our environment is constantly changing. There is no denying that. However, as our environment changes, so does the need to become increasingly aware of the problems that surround it. With a massive influx of natural disasters, warming and cooling periods, different types of weather patterns and much more, people need to be aware of what types of environmental problems our planet is facing.

Global warming has become an undisputed fact about our current livelihoods; our planet is warming up and we are definitely part of the problem. However, this isn't the only environmental problem that we should be concerned about. All across the world, people are facing a wealth of new and challenging environmental problems every day. Some of them are small and only affect a few ecosystems, but others are drastically changing the landscape of what we already know.

Our planet is poised at the brink of a severe environmental crisis. Current environmental problems make us vulnerable to disasters and tragedies, now and in the future. We are in a state of planetary emergency, with environmental problems piling up high around us. Unless we address the various issues prudently and seriously we are surely doomed for disaster. Current environmental problems require urgent attention.

15 Major Current Environmental Problems

1. Pollution: Pollution of air, water and soil require millions of years to recoup. Industry and motor vehicle exhaust are the number one pollutants. Heavy metals, nitrates and plastic are toxins responsible for pollution. While water pollution is caused by oil spill, acid rain, urban runoff; air pollution is caused by various gases and toxins released by industries and factories and combustion of fossil fuels; soil pollution is majorly caused by industrial waste that deprives soil from essential nutrients.

2. Global Warming: Climate changes like global warming is the result of human practices like emission of Greenhouse gases. Global warming leads to rising temperatures of the oceans and the earth' surface causing melting of polar ice caps, rise in sea levels and also unnatural patterns of precipitation such as flash floods, excessive snow or desertification.

3. Overpopulation: The population of the planet is reaching unsustainable levels as it faces shortage of resources like water, fuel and food. Population explosion in less developed and developing countries is straining the already scarce resources. Intensive agriculture practiced to produce food damages the environment through use of chemical fertilizer, pesticides and insecticides. Overpopulation is one of the crucial current environmental problem.

4. Natural Resource Depletion: Natural resource depletion is another crucial current environmental problems. Fossil fuel consumption results in emission of Greenhouse gases, which is responsible for global warming and climate change. Globally, people are taking efforts to shift to renewable sources of energy like solar, wind, biogas and geothermal energy. The cost of installing the infrastructure and maintaining these sources has plummeted in the recent years.

5. Waste Disposal: The over consumption of resources and creation of plastics are creating a global crisis of waste disposal. Developed countries are notorious for producing an excessive amount of waste or garbage and dumping their waste in the oceans and, less developed countries. Nuclear waste disposal has tremendous health hazards associated with it. Plastic, fast food, packaging and cheap electronic wastes threaten the well being of humans. Waste disposal is one of urgent current environmental problem.

6. Climate Change: Climate change is yet another environmental problem that has surfaced in last couple of decades. It occurs due to rise in global warming which occurs due to increase in temperature of atmosphere by burning of fossil fuels and release of harmful gases by industries. Climate change has various harmful effects but not limited to melting of polar ice, change in seasons, occurrence of new diseases, frequent occurrence of floods and change in overall weather scenario.

7. Loss of Biodiversity: Human activity is leading to the extinction of species and habitats and and loss of bio-diversity. Eco systems, which took millions of years to perfect, are in danger when any species population is decimating. Balance of natural processes like pollination is crucial to the survival of the eco-system and human activity threatens the same. Another example is the destruction of coral reefs in the various oceans, which support the rich marine life.

8. Deforestation: Our forests are natural sinks of carbon dioxide and produce fresh oxygen as well as helps in regulating temperature and rainfall. At present forests cover 30% of the land but every year tree cover is lost amounting to the country of Panama due to growing population demand for more food, shelter and cloth. Deforestation simply means clearing of green cover and make that land available for residential, industrial or commercial purpose.

9. Ocean Acidification: It is a direct impact of excessive production of CO2. 25% of CO2 produced by humans. The ocean acidity has increased by the last 250 years but by 2100, it may shoot up by 150%. The main impact is on shellfish and plankton in the same way as human osteoporosis.

10. Ozone Layer Depletion: The ozone layer is an invisible layer of protection around the planet that protects us from the sun's harmful rays. Depletion of the crucial Ozone layer of the atmosphere is attributed to pollution caused by Chlorine and Bromide found in Chloro-floro carbons (CFC's). Once these toxic gases reach the upper atmosphere, they cause a hole in the ozone layer, the biggest of which is above the Antarctic. The CFC's are banned in many industries and consumer products. Ozone layer is valuable because it prevents harmful UV radiation from reaching the earth. This is one of the most important current environmental problem.

11. Acid Rain: Acid rain occurs due to the presence of certain pollutants in the atmosphere. Acid rain can be caused due to combustion of fossil fuels or erupting volcanoes or rotting vegetation which release sulfur dioxide and nitrogen oxides into the atmosphere. Acid rain is a known environmental problem that can have serious effect on human health, wildlife and aquatic species.

12. Water Pollution: Clean drinking water is becoming a rare commodity. Water is becoming an economic and political issue as the human population fights for this resource. One of the options suggested is using the process of desalinization. Industrial development is filling our rivers seas and oceans with toxic pollutants which are a major threat to human health.

13. Urban Sprawl: Urban sprawl refers to migration of population from high density urban areas to low density rural areas which results in spreading of city over more and more rural land. Urban sprawl results in land degradation, increased traffic, environmental issues and health issues. The ever growing demand of land displaces natural environment consisting of flora and fauna instead of being replaced.

14: Public Health Issues: The current environmental problems pose a lot of risk to health of humans, and animals. Dirty water is the biggest health risk of the world and poses threat to the quality of life and public health. Run-off to rivers carries along toxins, chemicals and disease carrying organisms. Pollutants cause respiratory disease like Asthma and cardiac-vascular problems. High temperatures encourage the spread of infectious diseases like Dengue.

15. Genetic Engineering: Genetic modification of food using biotechnology is called genetic engineering. Genetic modification of food results in increased toxins and diseases as genes from an allergic plant can transfer to target plant. Genetically modified crops can cause serious environmental problems as an engineered gene may prove toxic to wildlife. Another drawback is that increased use of toxins to make insect resistant plant can cause resultant organisms to become resistant to antibiotics.

The need for change in our daily lives and the movements of our government is growing. Because so many different factors come into play; voting, governmental issues, the desire to stick to routine, many people don't consider that what they do will affect future generations. If humans continue moving forward in such a harmful way towards the future, then there will be no future to consider. Although it's true that we cannot physically stop our ozone layer from thinning (and scientists are still having trouble figuring out what is causing it exactly,) there are still so many things we can do to try and put a dent in what we already know. By raising awareness in your local community and within your families about these issues, you can help contribute to a more environmentally conscious and friendly place for you to live.

Image credit:

retinalfetish , 36747988

About Latest Posts

Rinkesh

A true environmentalist by heart ❤. Founded Conserve Energy Future with the sole motto of providing helpful information related to our rapidly depleting environment. Unless you strongly believe in Elon Musk's idea of making Mars as another habitable planet, do remember that there really is no 'Planet B' in this whole universe.

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VIT UNIVERSITY
(Estd. u/s 3 of UGC Act 1956)

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"The greatest threat to our planet is the belief that someone else will save it."
– Robert Swan

Know the products before use

Use the products which is reusable

reuseit®
everyday eco-solutions

Organic
Organic
Organic

Think Globally
Act Locally

IF YOU ATE TODAY
THANK
A FARMER

NO
GMO

ave you ever noticed that there is a distinct color at the bottom of each
oothpaste pack ?
Do you know the meaning of the colors ?
Green : Natural.
Blue : Natural + Medicine.
Red : Natural + Chemical composition.
Black : Pure Chemical.
BE AWARE OF THE PRODUCTS THAT YOU USE DAILY

buy
local
for your health, environment, and country

5 Digit Code
Starting With 9
means:
ORGANIC
(Grown Naturally. No chemicals)
4 Digit Code
Starting With 4
means:
CONVENTIONAL
(Grown with chemicals and pesticides.)
5 Digit Code
Starting With 8
means:
GMO
(Grown Unnaturally. Genetically modified.)

Try to Practice

Practice daily to lead a Sustainable living

1 PETE	2 HDPE	3 PVC	4 LDPE	5 PP	6 PS	7 OTHER
polyethylene terephthalate soft drink bottles, mineral water, fruite juice container, cooking oil	high-density polyethylene milk jugs, cleaning agents, laundry detergents, bleaching agents, shampoo bottles, washing and shower soaps	polyvinyl chloride trays for sweets, fruit, plastic packing (bubble foil) and food foils to wrap the foodstuff	low-density polyethylene crushed bottles, shopping bags, highly-resistant sacks and most of the wrappings	polypropylene furniture, consumers, luggage, toys as well as bumpers, lining and external borders of the cars	polystyrene toys, hard packing, refrigerator trays, cosmetic bags, costume jewellery, CD cases, vending cups	other plastics, including acrylic, polycarbonate, polyactic fibers, nylon, fiberglass

PLANT TREES

Adopt
a
Tree
PROJECT

use carbon dioxide
reducing global warming
provide firewood
reduce evaporation
rates
release
oxygen
provide
timber
provide habitat for
birds and insects
give frost
protection
top erosion
provide shade
provide food for bees,
birds and animals
have aesthetic value
(are beautiful)
sometimes fix
nitrogen
act as
windbreaks
prevent leachates
entering waterways

POLLUTION
FREE
ZONE

World
Environment
Day
June 5th

Environmental
Awareness

SUSTAINABLE
LIVING

1 NO POVERTY
2 ZERO HUNGER
3 GOOD HEALTH AND WELL-BEING
4 QUALITY EDUCATION
5 GENDER EQUALITY
6 CLEAN WATER AND SANITATION
7 AFFORDABLE AND CLEAN ENERGY
8 DECENT WORK AND ECONOMIC GROWTH
9 INDUSTRY, INNOVATION AND INFRASTRUCTURE
10 REDUCED INEQUALITIES
11 SUSTAINABLE CITIES AND COMMUNITIES
THE GLOBAL GOALS
For Sustainable Development
12 RESPONSIBLE CONSUMPTION AND PRODUCTION
13 CLIMATE ACTION
14 LIFE BELOW WATER
15 LIFE ON LAND
16 PEACE AND JUSTICE STRONG INSTITUTIONS
17 PARTNERSHIPS FOR THE GOALS

Thank You

Key Environmental Issues and Sustainable Living IPAT Equation

By

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IPAT Equation
Paul Ehrlich and John Holdren Model

IPAT Is Another Environmental Impact Model

In the early 1970s, scientists Paul Ehrlich and John Holdren developed a simple model showing how *population size* (P), *affluence* (A), or wealth, as measured by rates of resource consumption per person, and the beneficial and harmful environmental effects of *technologies* (T) help to determine the *environmental impact* (I) of human activities. We can summarize this model by the simple equation:

$$\text{Impact (I)} = \text{Population (P)} \times \text{Affluence (A)} \times \text{Technology (T)}$$

IPAT – High/middle/low Income Countries

TABLE 1.1 Environmental Impact of Selected High-, Middle-, and Low-Income Countries

Country	Population Size	Population Growth Rate	Resource Use Per Person	Use of Harmful Technology	Use of Beneficial Technology	Overall Environmental Impact
High-Income Countries						
United States	316 million	Moderate (0.5%)	Very high	Moderate	High	High
Japan	128 million	Negative (−0.2%)	High	Moderate	High	Moderate
Germany	82 million	Negative (−0.2%)	High	Moderate	High	Moderate
Middle-Income Countries						
China	1.35 billion	Moderate (0.5%)	Low	High	Moderate	High
India	1.26 billion	High (1.5%)	Low	High	Low	High
Brazil	194 million	Moderate (1%)	Low	High	Moderate	Moderate
Low-Income Countries						
Nigeria	402 million	High (2.6%)	Very low	High	Low	Moderate
Bangladesh	228 million	High (1.6%)	Very low	High	Low	Moderate
Congo	194 million	High (2.8%)	Very low	High	Low	Moderate

Compiled by the authors using data from Population Reference Bureau, Global Footprint Network, World Wide Fund for Nature, and Earth Policy Institute.

Some forms of technology such as polluting factories, gas-guzzling motor vehicles, and coal-burning power plants increase environmental impact by raising the harmful T factor. But other technologies reduce environmental impact by decreasing the T factor. Examples are pollution control and prevention technologies, fuel-efficient cars, and wind turbines and solar cells that generate electricity with a low environmental impact. These and newer technologies to come can help us reduce our ecological footprints and expand our beneficial environmental impact.

Thank You

Module – 1
Environment and Ecosystem

By
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SAS

Topics

- Key environmental problems and their basic causes.
- Ecosystem, earth – life support system and ecosystem components.
- Energy flow in ecosystem.
- Ecological succession.
- Nutrient, water, carbon, nitrogen, cycles.
- Effect of human activities on these cycles.

Environmental Problems

Solutions

Current Emphasis	Sustainability Emphasis
Pollution cleanup	Pollution prevention (cleaner production)
Waste disposal (bury or burn)	Waste prevention and reduction
Protecting species	Protecting where species live (habitat protection)
Environmental degradation	Environmental restoration
Increased resource use	Less wasteful (more efficient) resource use
Population growth	Population stabilization by decreasing birth rates
Depleting and degrading natural capital	Protecting natural capital and living off the biological interest it provides

Environmental Impact

IPAT Equation
Paul Ehrlich and John Holdren Model

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Ecosystems

Goal for environmental science is to learn about these complex interactions

Earth's Life – support system

- Scientific studies reveal that the earth's life-support system
  - consists of four main spherical systems that interact with one another
  - the atmosphere (air),
  - the hydrosphere (water),
  - the geosphere (rock, soil, sediment) and
  - the biosphere (living things)

The atmosphere

- The atmosphere is spherical in shape.
  - Inner troposphere: 17 Kms above sea level.
  - 78% of nitrogen and 21 % of oxygen, 1% of air includes water vapor, CO_2, methane. – green house gases.
  - Stratosphere (11-31 miles) above earth's surface.
  - Its lower portion is ozone. (UV radiation)
  - Hydrosphere: earth's water. Found as ice bergs, liquid water, water is in form of ocean.

  - Geosphere: consist of hot core, mantle, outer crust.
  - Lithosphere is the earth's solid crust and upper mantle.
- Biosphere occupies the atmosphere, hyrosphere and geosphere – life is found.
- Ecology is the interaction in thin layer of water, air, soil and organism.

Life exist on land and water

- Classification: two types
  - **Biomes**: eg: forest, deserts, grasslands, with different where species live in.
  - Aquatic life zone:
    - Fresh water life zones: lakes, streams
    - Marine life zones- coral reefs, estuaries, deep ocean.

Major component of ecosystem

Major component of ecosystem
Biotic Structure

Grassland Ecosystem Showing Component Parts

- Producers
- Consumers
- Decomposers

Producers

carbon dioxide + water + **solar energy** → glucose + oxygen

$6\,CO_2 + 6\,H_2O$ + **solar energy** → $C_6H_{12}O_6 + 6\,O_2$

- Photo Autotrophs: Auto- Self, Trophs- Food, Photo- Light.

  Eg. Green Plants

Chemo-autotrophs: which produces the organic matters- oxidation, in absence of sun light.

Eg. Micro – Organisms.

Consumers

- Herbivores: they directly feed on producers.

- Carnivores: they feed on other consumers.

- Called as secondary consumers.

Consumers contd..

- Omnivores: they feed on both plants and animals.

- Detritivores: feed on dead organism, wastes of living organism.

Detritus feeders

- These feed on dead organism/ dead bodies of other organism called detritus.
  - Eg: earthworm, insects, larger scavenger- vultures.
  - These organism extract some of the chemical energy stored in dead organic matter, bodies, wastes in turn serve as food for detritus.

Aerobic respiration

- Some producer , consumer and decomposer use the chemical energy stored in glucose and other organic compounds to their life process.
- The most of cells energy is released by aerobic respiration,

glucose + oxygen → carbon dioxide + water + **energy**

$$C_6H_{12}O_6 + 6\,O_2 \rightarrow 6\,CO_2 + 6\,H_2O + \text{energy}$$

Anaerobic respiration

- Some decomposers get energy by breaking done glucose in absence of oxygen.
- This form of cellular respiration is called **anaerobic respiration/ fermentation.**
- The end products are methane gas, ethyl alcohol, acetic acid- vinegar, hydrogen sulfide.
- Note: all organism get their energy from aerobic or anaerobic respiration, but plants – photosynthesis.

Major component of ecosystem

Abiotic Structure

the physical and chemical components

- Physical factors: sunlight, shade, average temperature, max-min. temperature, rainfall, etc..
- Chemical Factors: carbon, nitrogen, phosphorus, hydrogen, oxygen, sulphur….
- Organic substances present in the soil influences the functioning of the ecosystem.

Functional Attributes

- Food Chain, food webs and trophic structure.
- Energy flow.
- Cycling of nutrients.
- Primary and secondary production.
- Ecosystem development and regulation

Definitions to know

- Food Chain: the flow of energy is mediated through a series of feeding relationships in a definite sequence.
- Tropic structure: the producers and consumers are arranged in the ecosystem in a definite manner and their interaction along with the population size.
- **Tropic level:** each food level.
- **Standing crop/ standing biomass:** the amount of living matter at each tropic level at a given time.

FOOD CHAIN & FOOD WEB

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FOOD CHAIN

- The sequence of eating and being eaten in an ecosystem is known as **food chain**.

TYPES OF FOOD CHAIN

Grazing Food chain

Detritus Food Chain

Grazing Food Chain

Detritus Food Chain

- It starts from dead organic matters.
- Even the decomposers consumed by detritivores and their predators.

- Eg. Estuary
- Grazing food chain derives energy from plant, while detritus gets from plant biomass

Saprotrophs: they feed on dead organic matter.

- Large quantity of leaf materials falls in the form of litter into the water.
- The leaf fragments are eaten by saprotrophs.
- Both the grazing and detritus food chain occur in natural ecosystem, but **grazing predominates.**

FOOD WEB

- It is the network of food chains where different types of organisms are connected at different trophic levels, so that the no. of options of eating and being eaten at each trophic level.

Desert food web
Hawks
Desert foxes
Scorpions
Snakes
Large lizards
Kangaroo rats
Insects
Small lizards
Desert plants

Lion
Jackal
Goat
Kite
Wild cat
Owl
Rabbit
Snake
Mouse
Green Plant

Water Bird Food Web

Significance of food chain and food webs

- Significant role in energy flow and nutrient cycle.
- Food chain are helping in maintaining and regulating the population size.: Ecological balance.
- Biological magnification:
- Eg. Pesticides transferred from one trophic level to the other.

Case study

- Biomagnification of DDT was observed in some birds like **Osprey- Sudden decline in population.**
- **The young ones were hatched out in premature condition leading to death.**
- **The reason is due to biomagnification of DDT.**
- **DDT used in low conc. – passed thro' phytoplanktons → Fish → Birds.**

Contd…

- The conc. of DDT was magnified several times in birds which caused the **thinning of shells in bird's eggs**- cause death to the young ones.
- The toxic chemicals are passed from one trophic level to the other.

- Osprey Bird

Vulture Distribution in India

- White Rumped Vulture
- Indian Vulture
- Slender Billed Vulture
- Himalayan Griffon
- Eurasian Griffon
- Egyptian Vulture
- Red Headed Vulture
- Cinereous Vulture
- Bearded Vulture

Slender Billed Vulture

Eurasian Griffon

Vulture & Diclofenac Sodium

The Indian vulture (*Gyps indicus*) is an Old World vulture native to India, Pakistan and Nepal.

NCBI Resources How To

PMC
US National Library of Medicine
National Institutes of Health

PMC

Advanced Journal list

COVID-19 is an emerging, rapidly evolving situation.
Get the latest public health information from CDC: https://www.coronav
Get the latest research from NIH: https://www.nih.gov/coronaviru
Find NCBI SARS-CoV-2 literature, sequence, and clinical content: https://www.ncbi.n

Journal List > Biol Lett > v.2(2); 2006 Jun 22 > PMC1618889

THE ROYAL SOCIETY PUBLISHING | BIOLOGY LETTERS

ABOUT
BROWSE BY SUBJECT
ALERTS
FREE TRIAL

Biol Lett. 2006 Jun 22; 2(2): 279–282.
Published online 2006 Jan 10. doi: 10.1098/rsbl.2005.0425

PMCID: PMC1618889
PMID: 17148382

Toxicity of diclofenac to *Gyps* vultures

Gerry E Swan,[1] Richard Cuthbert,[2] Miguel Quevedo,[3] Rhys E Green,[2,4] Deborah J Pain,[2,*] Paul Bartels,[5] Andrew A Cunningham,[6] Neil Duncan,[1] Andrew A Meharg,[7] J Lindsay Oaks,[8] Jemima Parry-Jones,[9] Susanne Shultz,[2,†] Mark A Taggart,[7] Gerhard Verdoorn,[10] and Kerri Wolter[11]

Biol

Ban on diclofenac, a lifeline for vultures

TNN | Sep 2, 2015, 08:18 IST

A- A+

KOZHIKODE: The Union government decision to ban multi-dose vials of painkiller drug diclofenac has sparked fresh hopes for the survival of three critically-endangered vulture species in the state, the combined population of which is currently below 50 inside the Wayanad Wildlife Sanctuary (WWS). Their breeding population at last count was estimated at 35 Oriental white-rumped vultures, four Indian long-billed vultures and five red-headed vultures.

SSC- Vulture

SSC Groups

Directory | Amphibians & Reptiles | Birds | Fishes | Invertebrates | Plants & Fungi | Mammals | Cross-cutting

Birds

- Asian Songbird Trade
- Bird
- Bustard
- Cormorant
- Crane
- Diver / Loon
- Duck
- Flamingo
- Galliforme
- Goose
- Heron
- Hornbill
- Pelican
- Penguin

Vulture

The IUCN SSC Vulture Specialist Group is dedicated to Accipitrid and Cathartid vulture conservation, research and education.

Links

- Website
- 2018 IUCN SSC Vulture SG report
- 2016-2017 IUCN SSC Vulture SG report

Thank You

Energy flow – Ecosystem

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contents

- Gross primary production
- Net primary production
- First law of thermodynamics
- Second law of thermodynamics

Energy & types

- In scientific term
  - Work = force x distance (eg: put a object on a table or touch a hot object)
  - Capacity to do work or transfer of heat.
- Two types
  - Kinetic energy : moving energy (wind energy, hydro energy)
  - **Potential energy:** stored energy (water in a dam, hot sand in your palm)
  - Potential energy can be converted into kinetic energy (eg: an object falling down from your hand , an automobile burns on gasoline)

Energy flow- Food Chain and Food webs

- A sequence of organisms, each of which serves as a source of food for the next, is called a **food chain**
- It helps to determines – chemical energy, nutrients (one to the another)
- Nutrients to soil – reuse by producers.

ThomsonNOW Active Figure 3-14 A food chain.

Gross primary production & NPP

- The amount of biomass that a ecosystem is determined by the amount of energy captured and stored as chemical energy by producers.
- GPP is the rate at which an ecosystem producers **convert solar energy into chemical energy** as biomass.
- Measured in terms of energy production per unit area over time given. (Kcal/m^2/yr)
- ***Net primary production (NPP) = GPP- R***
  - R is energy used in respiration

GPP & NPP

Primary productivity
• Primary productivity is the rate of energy capture by producers.= the amount of new biomass of producers, per unit time and space

• Gross primary production (GPP)
= total amount of energy captured
• Net primary production (NPP)
= GPP - respiration
• Net primary production is thus the amount of energy stored by the producers and potentially available to consumers and decomposers.

Models of ecological energy flow

Universal energy flow model

NU

Flowing Energy

Stored Energy

A single trophic level

The loss of energy is due to locomotion, respiration, excretion

Single channel energy flow model

Producers → herbivores → carnivores

A food chain - Unidirectional flow of energy

Both stored energy and flowing energy decrease while moving through a food chain_

Y-shaped or two channel energy flow model

Grazing food chain

Detritus food chain

Passage of energy via two food chains

Energy and the Laws of Thermodynamics

20.1 – The Laws of Thermodynamics Govern Energy Flow.

Energy exists in many forms, such as heat, light, chemical energy, and electrical energy. **Energy is the ability to bring about change or to do work.** Thermodynamics is the study of energy.

Energy and the Laws of Thermodynamics

The 1st Law of Thermodynamics:
Energy can be changed from one form to another, but it cannot be created or destroyed. The total amount of energy and matter in the Universe remains constant, merely changing from one form to another.

Isaac Newton (1643-1727)

Energy and the Laws of Thermodynamics

The 2nd Law of Thermodynamics: "*in all energy exchanges, if no energy enters or leaves the system, the potential energy of the state will always be less than that of the initial state.*" In energy transfer, some energy will dissipate as heat. The flow of energy maintains order of life.

Isaac Newton (1643-1727)

Second Law of Thermodynamics

- - Scientists have studied many ecosystems and have concluded that this energy loss is a constant pattern. In fact, scientists have calculated that the percentage (%) of usable energy transferred from one organism to another is 10%.
- !! - That means that 90% of energy is lost as heat!!!
- So…. if producers captured 10,000 calories from the sun, then only bout 1,000 calories will be available to support primary consumers (herbivores), and only about 100 calories to support secondary consumers (carnivores or omnivores).

Producers		1^0 Consumers		2^0 Consumer
10,000 calories	→	1000 calories	→	100 calories

Loss of energy – respiration/locomotion

Pyramid of Energy

Always it is in upright position.

Cannot do with matter and energy

- **Law of conservation**: no atoms are created or destroyed. *We cannot change matter, can change only physical state – one form to another*
- **First law of TD**: we cannot get more energy from what we have put in.
- **Second law of TD**: we end in low amount of energy than we start with.

Thank You

PROCESS OF ECOLOGICAL SUCCESSION

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An overlook

Hult (1885) – He was the first to term succession for the orderly changes in communities.

Clements (1916) while studying plant communities defined succession as the natural process by which the same locality becomes successively colonised by different groups or communities of plants.

Odum (1971) preferred to call this orderly process as ecosystem development rather than the more often known ecological succession.

Definition

Ecological succession is defined as an orderly process of changes in the community structure and function with time mediated through modifications in the physical environment and ultimately culminating in a stabilized ecosystem known as climax. The whole sequence of communities which are transitory are known as *Seral stages* or *seres* whereas the community establishing first of all in the area is called a *pioneer* community.

Types of Ecological Succession

Primary succession

The process of Creating life in an area where no life previously existed.

The soil layer thickens, and grasses, wildflowers, and other plants begin to take over

Secondary Succession

The process of re- stabilization that follows a disturbance in an area where life has formed an ecosystem.

Ecological Succession of Coral Reefs

Small coral polyps colonize the rocks.

These polyps grow and divide to form coral colonies.

The shape of the coral reefs attracts small fish and crustaceans that are food for the larger fish. Thus, a fully functional coral reef exists.

Examples of Succession

Primary

Secondary

Pioneer Species

Lichens break down rock to form soil.

Low, growing moss plants trap moisture and prevent soil erosion

Types of Seres

Hydrosere	Succession in Aquatic habitat.
Xerosere	Succession in Dry habitat.
Lithosere	Succession in Bare rock surface
Psammosere	Succession initiating on Sandy Areas.
Halosere	Succession starting in saline soil.
Eosere	Development of Vegetation in an era.

Xerosere (lithosere)

bare rock→lichens→mosses→grasses→shrubs→trees

Hydrosere

(*a*) Open water body (lake), sediment brought in by river.

(*b*) Sediment accumulation continues, organic debris from plants too add to soil formation and shrinking of water body occurs.

(*c*) A mat of vegetation covers the water which is mostly a marshy habitat now, with a small part as aquatic system.

Five process

Nudation

Invasion

Competition & Coaction

Reaction

stabilization

Nudation

Development of bare area without life forms.

Bare area due to land slides, volcanic, overgrazing etc…

Invasion

Successful establishment of one or more species on a bare area.

Ie. Dispersal of seeds, spores etc.

As they grow, the species increase the numbers and form the groups.

Competition & Coaction

The no. of individuals grows there : **competition, both intra** and inter-specific, nutrition etc.

They influence each other in a no. of ways: coaction

Reaction

The living organism grow, use water, nutrients from the substratum, in-turn they are influenced by the environment, this is known as **reaction.**

Stabilization

Ultimate culminates in more or less stable community called **climax.**

The Circle of Life in Secondary Succession

Secondary Succession
Pioneer Species
Intermediate Species
Climax Community
Fire
Annual plants
Grasses and perennials
Grasses, shrubs, pines, young oak and hickory
Mature oak and hickory forest
0 years
1-2 years
3-4 years
5-150 years
150+ years
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Threats to ecological succession

The grasses that move in as pioneer species – weeds

Subsequent growth of shrubs – change as brush

Without intermediate stages, the habitat cant return to a natural forest

Stability of community depends various factors.

Ecological Succession Never Ends …….

Thank You

Nutrient Cycle and its Effects on Ecosystem

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Nutrients Cycle within Ecosystem

- The elements and compounds that make up nutrients move continually through air, water, soil, rock and living organism in cycles called **biogeochemical cycles or nutrient cycles**.
- These cycles are driven directly or indirectly by solar energy and gravity, includes **water, carbon, nitrogen and phosphorus cycles.**
- **Temporary storage sites such as atmosphere, oceans, water and underground deposits are called as reservoirs.**

Water cycle

- Water cycle collects, purifies, and distributes the earth's fixed supply of water.

Transpiration, Precipitation, Evaporation

- About 84 % water vapor in atmosphere comes from the ocean and rest from land.
- 90 % of water reaches the atmosphere evaporates from the surface of plants through a process called transpiration.
- Aquifers: water returning to earth's surface as precipitation by various paths. Some precipitation sinks through soil and permeable rock formations to underground layers of rock, sand and gravel called aquifers- stored as ground water.
- Some combines with CO_2 during photosynthesis and produce high energy organic compounds-carbohydrates.
- In terrestrial ecosystems: most of precipitation becomes as surface runoff.

Fresh water

- **0.024 %** of earth's vast water supply is available as freshwater in accessible to groundwater deposits, lakes, rives, and streams. Rest are salty, stored as ice.
- The water cycle by withdrawing large amounts of fresh water, clearing of agriculture land, soil erosion, pollution, ground water pollution and leads to climate change.

Carbon Cycle

Carbon Cycles- Biosphere

- Carbon- building block of carbohydrates, fat, protein, DNA, and other organic compounds- shown in fig.
- Carbon dioxide – which make up 0.038% of volume of the atmosphere and dissolved in water.
- Key component of nature's thermostat.
- If carbon- removes CO_2 from atmosphere, the atmosphere is cool.
- If it generates CO_2 the atmosphere will get warmer. – change in climate happens.
- Terrestrial producers remove CO_2 from the atmosphere and aquatic removes in water. (CO_2 to glucose sugar unit)
- Aerobic respiration : carried by producers, consumers and decomposers.

- Some carbon atoms take long term to recycle. Eg: fossil fuels- coal, oil and natural gas.
- This carbon is not released in atmosphere as CO_2 for recycling until these fuels are extracted and burned.
- Measures to alter CO_2 : afforestation, grasslands maintenance, - global warming is decreased and decrease in sea level.

Nitrogen cycle

- The major reservoir for nitrogen is the atmosphere.
- Unreactive N_2 gas makes up 78% of atm. Volume.
- Component of proteins, DNA, vitamins, etc.
- It cannot be absorbed. Can be used directly as nutrient by multicellular plants or animals.

- Two natural process convert or fix nitrogen into compounds useful as nutrients for plants and animals.
  - One is electrical discharge, - in atmosphere.
  - Other is nitrogen fixing bacteria –nitrogen cycle.
- nitrogen fixation: special bacteria in soil and blue green algae in aquatic environment combine Nitrogen with hydrogen to take ammonia.
- Bacteria takes up nitrogen to produce nutrients and excrete in soil or water.
- Some ammonia is converted to ammonium ions that can be used by plants.

Phosphorus cycle

atural capital: simpli-
he *phosphorus cycle,*
nful human impacts
rrows. **Question:** What
in which you directly or
the phosphorus cycle?

- The major reservoirs for phosphorus is phosphate salts containing phosphate ions in rock/ ocean sediments.
- It is slow compared to other cycle.
- The dissolved phosphate ions are absorbed by roots of plants and other producers.
- Major component vertebrate bones and teeth.
- It is applied as fertilizer.
- This leads to eutrophication- phosphorus rich run-off from land produce high amount of algae, which can upset chemical cycling and other lake ecosystem.

Thank you