PRINCIPLES OF ORGANIC FARMING

AGR-323

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INTRODUCTION TO ORGANIC FARMING

- Organic Farming is based on production standards which are environmentally and are socially, economically and ecologically sustainable.
- It is believed to play a pertinent role in safe guarding biodiversity, improving soil health and inclusive and sustainable development of the farming community.

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GREEN REVOLUTION

- In the 1960s, India saw the beginning of Green Revolution in the country. Where farming switched significantly towards more chemical intensive techniques.
- This shift was extremely helpful in increasing the yield of grains and ensure food security for the larger population.

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EFFECTS OF GREEN REVOLUTION

Loss of soil fertility, erosion of soil, soil toxicity, diminishing water resources, pollution of underground water, salinity of underground water, increased incidence of human & livestock diseases, deforestation, consumption of biodiversity, expanded frequency of mosquito borne maladies bother resurgence and global warming are some of the negative effects of Green Revolution in India.

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SHIFT PARADISM

- The recent time have, however, seen a shift by consumers who are now moving towards organically produced food.
- Organic products are broadly defined as those food products which are produced without the use of synthetic, external inputs such as chemicals, fertilizers, pesticides, synthetic hormones or genetically modified organisms.
- The reasons for this paradism shift are said to be two-fold:-

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- One increased awareness among consumers, farmers, policy makers and environmentalist about the ill effects of chemicals in agricultural produce.
- Growth in the price premium on the exports of organic produce in developed countries.
- As a result we are witnessing that across 170 countries, the total land under organic farming has gone up from 11 million hectares in 1999 to 50.9 million hectare in 2015.

Religious Documentation of Organic farming

Oldest practice	10000 years old, dating back to Neolithic age, practiced by ancient civilization like Mesopotamia, Hwang Ho basin etc.
Ramayana	(All dead things – rotting corpse or stinking garbage returned to earth are transformed into wholesome things that nourish life. Such is the alchemy of mother earth – as interpreted by C. Rajagopalachari).
Mahabharata (5500 BC)	Mention of Kamadhenu, the celestial cow and its role on human life and soil fertility.
Kauthilya Arthashastra (300 BC)	Mentioned several manures like oil cake, excreta, excreta of animals.
Brihad-sanhita (by Varahmihir)	Described how to choose manures for different crops and the methods of manuring.
Rig Veda (2500-1500 BC)	Mention of organic manure in Rig Veda 1, 161, 10, 2500-1500 BC, is Green Manure in Atharva Veda 11 8.3, (1000 BC). In Sukra (IV, V, 94, 107-112) it is stated that to cause healthy growth the plant should be nourished by dungs of goat, sheep, cow, water as well as meat. A reference of manure is also made in Vrksayurveda by surpala (manuscript, oxford, No 324 B, Six, 107-164)
Holy Quran (590 AD)	At least one third of what you take out from soils must be returned to it implying recycling or post-harvest residue.

ORGANIC FARMING

organic farming is a system which avoids or largely excludes the use of synthetic inputs (such as fertilizers, pesticides, hormones, feed additives etc) and to the maximum extent feasible rely upon crop rotations, crop residues, animal manures, off-farm organic waste. (USDA, 1980)

"It is a holistic production management system that promotes and enhances health of agro-ecosystem, including biodiversity, biological cycles and soil biological activity". (FAO, 2002)

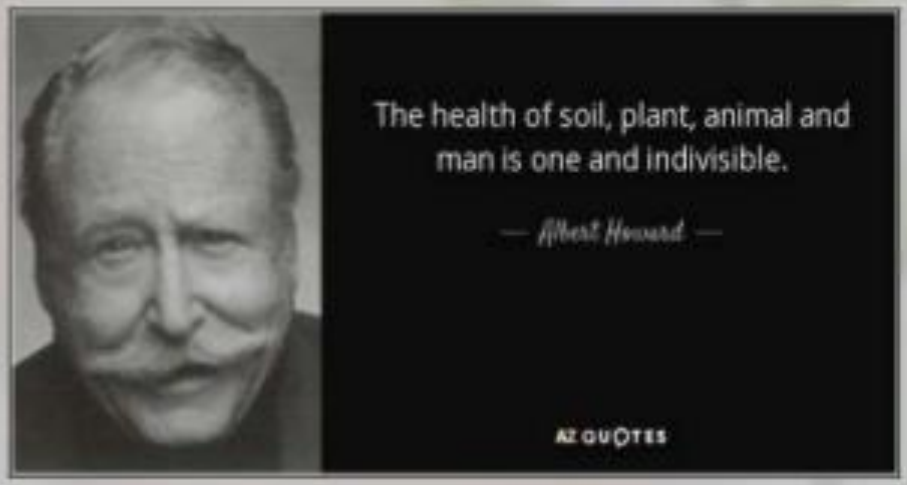
ORGANIC FARMING : DEFINITION

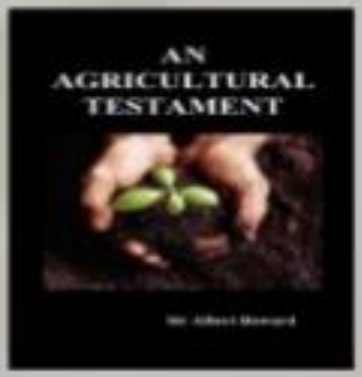
- Codex Alimentarius Commission defines "organic farming" as holistic production management system , which promotes and enhances agro-ecosystem health, including biodiversity, biological cycles and soil biological activity.

- It emphasizes the use of management practices in preference to the use of off farm inputs, taking into account that regional conditions require locally adapted systems.

- This is accomplished by using, where possible , agronomic, biological and mechanical methods, as opposed to using synthetic materials, to fulfil any specific function within the system.

Sir Albert Howard : Father of modern organic agriculture.

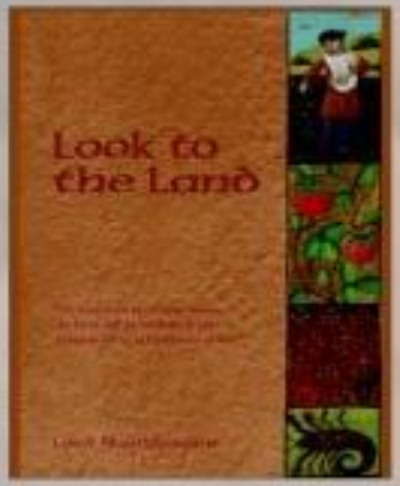




Published in 1940

Lord Northbourne coined the term "organic farming".

Published "Look to the land " in 1940



PRINCIPLES OF ORGANIC FARMING

- The principles of organic agriculture were established by the IFOAM in September 2005
- The four principles of organic farming are as follows:-

1. **Principle of Health**
2. **Principle of Fairness**
3. **Principle of Care**
4. **Principle of Ecology**

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PRINCIPLE OF HEALTH

- Organic agriculture should sustain and enhance the health of soil,plant,animal human and planet as one and individual.
- This principle points out that the health of individuals & communities can not be separated from the health of ecosystems healthy soils produce healthy crops that foster the health of animals and people.
- Health is the wholeness & integrity of living systems.

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- It is not simply the absence of illness, but the maintenance of physical, resilience & regeneration are key characteristics of health.
- The role of organic agriculture , weather in farming, processing, distribution, or consumption is to sustain & enhance the health of ecosystems & organisms from the soil & human beings.
- Organic farming is intended to produce high quality, nutritious food that contributes to preventive health care and well being.

I. *Health of soil, plants, animals and humans.*

II. *Produce high quality and nutritious food free from harmful chemicals.*

III. *Health is a wholeness and integrity of living system.*

PRINCIPLE OF FAIRNESS

- Organic agriculture should build on relationships that ensure fairness with regard to the common environment and life opportunities.
- Fairness is characterized by equity, respect, justice and stewardship of the shared world, both among people and in their relations to other living beings.
- This principle emphasizes that those involved in organic agriculture should conduct human relationship in a manner that ensures fairness at all levels and to all parties – such as farmers, workers, processors, distributors, traders and consumers.
- It aims to produce a sufficient supply of good quality produce.

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Equity, respect and justice for all living things ensure fair share of all parties such as farmers, workers, processors, distributors, traders and consumers.

PRINCIPLE OF CARE

- Organic agriculture should be managed in a precautionary and responsible manner to protect the health and well being of current and future generations and the environment.
- It is a living and dynamic system that responds to internal and external demands and conditions.
- It can enhance efficiency and increase productivity, but this should not be at the cost of jeopardizing health and well being.
- Consequently new technologies need to be assessed and existing methods reviewed.

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I. *Take preventive measures to protect and conserve natural sources for all generations to come.*
II. *It states that precaution and responsibility are the key concerns in management, development and technology.*

PRINCIPLE OF ECOLOGY

- Organic agriculture should be based on living ecological system and cycles, work with them, emulate them and help sustain them.
- The principle roots of organic agriculture within living ecological system.
- It states that production is to be based on ecological processes and recycling nourishment and well being are achieved through the ecology of the specific production environment.

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I. *Sustaining natural system/ promote reuse, recycling and efficient management of resources.*
II. *It states that production is to be based on ecological processes and recycling.*

SCOPE IN INDIA

- The scope of organic farming in India has been tremendously increasing. This is mainly due to the new research made in the field of agriculture.
- It has facilitated the farmers with new measures for more production eliminating the activity of bypass methods.
- The discovery of various new diseases arising out of artificial production of fruits and vegetables have clearly set the minds of people for a shift to organic farming.

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- Health conscious is another important factor for this huge transformation. It could also be named as the race in the new lifestyle.
- Consumption of organic products mainly spread from one person to another.
- This opens up opportunities for many new entrepreneurs in India with a huge response from the consumers.
- The set up cost and maintenance is extremely less since the method does not involve use of artificial products for farming.

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- India ranks 33rd in the world in terms of area under organic farming.
- India ranks 88th in terms of ratio of agriculture land under organic crop to total farming area.
- Madhya Pradesh (232887ha) has highest area under organic farming. Maharashtra (85536ha) is at second. (APEDA 2013-14)
- Uttrakhand (24739ha) and Sikkim(60843ha) are the organic states. (APEDA 2013-14)

PRESENT STATUS OF ORGANIC FARMING IN INDIA

- India holds a unique position among 170 countries practicing agriculture.
- It has 6,50,000 organic producers, 699 processors, 699 exporters and 7,20,000 hectares under organic cultivation.
- India produces about 1.35 million Metric Ton(2015-16) of certified organic products which include all variety of food products.
- India ranked 11th in organic product exports in 2015.
- Area under certified organic cultivation in India contributes only 2.59% i.e. 1.5 million hectares of total organic cultivation area of 57.8 Hectares

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Major products produced in India by organic farming

TYPE OF PRODUCT	PRODUCTS
Commodity	Tea, Coffee, Paddy, Wheat, Sugarcane
Spices	Cardamom, Black pepper, White pepper, Ginger, Turmeric, vanilla, Tamarind, Clove, Cinnamon, Nutmeg, Mace, Chilli
Pulses	Red gram, Black gram
Fruits	Mango, Banana, Pineapple, Orange, Cashew nut, Walnut
Vegetables	Okra, Brinjal, Garlic, Onion, Tomato, Potato
Oil seeds	Mustard, Sesame, Castor, Sunflower
Others	Cotton, Herbal extracts

Garibay and Jyoti(2003)

INITIATIVES TAKEN BY GOVERNMENT TO PROMOTE ORGANIC FARMING

programme	highlights
National project on Organic Farming (NPOF)	▪ Central scheme- implemented during the 10th FYP with an outlay of Rs 57.04cr . ▪Objective- to encourage the organic food production and promote manufacture and uses of organic & biological inputs such as organic manure, bio pesticides & bio fertilizers. ▪Provides financial assistance for constructing foods& vegetables , waste compost units, bio fertilizers, bio pesticides production unit through NABARD.

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National project on management 0f soil health & fertility (NPMSF)	**▪Implemented during the 11th FYP with an outlay of Rs 429.85 cr.** **▪Objective- to promote the judicious and balanced use of fertilizers and organic manure on the basis of soil test results.** **▪Provide financial assistance for promoting use of organic manure.**
Network project on Organic farming	▪ initiative taken by ICAR in the 10th FYP at the project directed for farming system research at Modipuram. ▪Objective- to develop package of practices for different cops and farming systems for organic farming in different agro climatic conditions of India. ▪Package of practices have been developed for basmati rice, rain fed wheat, maize, red gram, chickpea , soyabean , groundnut ,mustard, isabgol , black pepper, ginger, tomato, cabbage and cauliflower.

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National Horticulture Mission (NHM) & Horticulture Mission for Northeast & Himalyan state	▪ Centrally sponsored scheme, launched in2005-06. ▪Objective- to strengthen the growth of horticulture sector comprising of fruits ,vegetables, roots and tuber crops, mushroom spices, flowers, aromatic plants, cashew and cocoa. ▪Provides subsidy of 50% for establishing vermi compost units. ▪Provides assistance of organic certification of Rs 5 lakh for a group of farmers covering an area of 50ha. ▪Provides Rs 30,000/ beneficiary for adopting organic farming

Rashtriya Krishi Vikas Yojana(RKVY)	Provides assistance to the projects formulated and approved by the state for decentralized production & marketing of organic fertilizers.
National Mission for Sustainable Agriculture (NMSA)	▪100% assistance by the state government for setting up of mechanization of fruit/vegetable waste. ▪100% aid for setting up of quality control laboratory for testing bio fertilizers, upto Rs 85 lakhs.

Paramparagat Krishi Vikas Yojana (PKVY)	▪Provides Rs 20,000 to the farmers upto 3 years for performing organic farming. ▪Procuring packaging material, preparation of labels, holograms, printing & branding of organic produce Rs 2500/acre. ▪Provides financial aid for a cluster of 50 acres, to the tune of Rs 1,20,000 for transporting organic produce to the market place. ▪In order to motivate & support marketing facilities, financial assistance of Rs 36330/cluster is provided to organize an organic fair

0RGANIZATIONS FOR PROMOTION OF ORGANIC AGRICULTURE

INTERNATIONAL ORGANIZATIONS-

- ISO- International organization for standardization Geneva-1947.
- WWOOF- Worldwide Opportunities on Organic frms, England, 1971.
- ISO- International Federation of Organic Agriculture movement Germany-1972.
- FIBL- Research Institute of Organic agriculture, Switzerland-1973.
- NOFA- North east Organic Farming Association, New York – 1982.
- OFRF- Organic farming Research Foundation, California- 1990.
- IOIA-International Organic Inspectors Association-USA-1991.
- IOAS-International Organic Accreditation Service-Germany-1997.

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NATIONAL ORGANIZATIONS-

- ISRO- Indian Space Research Organization, Bangalore- 1969.
- NPOP- National Programme for Organic Production, New Delhi- 1985.
- APEDA-Agriculture & processed food products Export Development Authority –New Delhi- 1985.
- CFQCTI- Central Fertilizer Quality Control & Training Institute , Faridabad- 1985.
- OFAI- Organic farming Association of India, Goa – 2002.
- NIOF- National Institute of Organic farming, Ghaziabad- 2003.
- ICCOA-International Competence Centre for Organic Agriculture Banglore-2004.
- NCOF- National Center of Organic farming, Ghaziabad- 2004.

NGOs INVOLVED IN ORGANIC FARMING

- **Haritika**- Bundelkhand, Madhya Pradesh focused on water harvesting & management, crop optimization, soil conservation practices etc.
- **Manuvikasa**- Sirsi, Karnataka, focuses on issues of water conservation(atleast four water tanks at every village), education improvement and livelihood development.
- **Rajasthan Bal Kalyan Samiti**- Udaipur, Rajasthan, works on healthy empowered and educated communities . It has assisted more than 8500 families in agriculture & horticulture based livelihood programmes.

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- **Navdanya**- New Delhi, promotes bio diversity conservation, bio diversity, organic farming and the process of seed saving etc.
- **SEVA**- Tamil Nadu, works on agriculture & environment.
- **National Agro Foundation**- Tamil Nadu, working for integrated rural development with special focus on farm sector to create a sustainable livelihood model.
- **Myrada**- Karnataka, promoting livelihood activities, management and development of natural resources etc.

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- **DHAN Foundation**- Madurai, Tamil Nadu, works on new innovations and upscale novel interventions in combating poverty and creating a fair and equitable society.
- **Organic Agriculture in Rural Development (OARD**)- 30 NGOs are involved in the promotion of rural development. Two villages have been adopted by each of the NGOs training and support services are provided by AOFG India
- **Agriculture & Organic farming group(AOFG**)- this is an ambitious project of the farmers association and farmer companies providing quality extension through farmer field schools, value addition, supply chain and marketing. The commodity focus are coffee, spices, cotton and fruits.

Out of these several other NGOs are working on Organic farming and Natural Resource Management at national level.

OTHER IMPORTANT SCHEMES

- Soil health card-2015- nutrient status of soil at house hold level.
- Pradhan mantri fasal bema yojna(PMFBY)-2016 – premium based crop security.
- Neem coated urea (NCU) –2004 enhancement of nitrogen use efficiency.
- Pradhan mantri krishi vikas yojna (PMKSY) -2015 – increasing of water use effiency.
- National agriculture market (e-NAM) -2016 – e marketing infrastructure.

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- Micro irrigation fund (MIF) - 2017- promotion of micro irrigation.
- Agriculture contingency plan – 2010- reducing risk of aberrant monsoon.
- Rain fed area development program (RADP)- drought management.
- National watershed development project for rain fed areas (NWDPRA) - 2011 watershed development.

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NMSA consists of the following schemes:-

- Rain fed Area Development (RAD)
- Soil Health Management(SHM)
- Sub mission on Agro forestry (SMAF)
- Soil & Land use Survey of India(SLUSI)
- Mission Organic Value Chain Development in North Eastern Region (MOVCDNER)
- National Center of Organic farming (NCOF)
- Central Fertiliser Quality Control & Training Institute(CFQC&TI).

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- Livestock Insurance Scheme
- National Scheme on Welfare of Fishermen
- Scheme on fisheries Training & extension
- Grameen Bhandaran Yojana

Ecosystem is the basic functional unit of ecology. The term ecosystem is coined form a Greek word meaning study of home.

Definition

A group of organisms interacting among themselves and with environment is known as ecosystem. Thus an ecosystem is a community of different species interacting with one another and with their non living environment and one another and with their non- living environment exchanging energy and matter.

Example

Animals cannot synthesis their food directly but depend on the plants either directly or indirectly.

TYPES OF ECOSYSTEM- Natural ecosystem

Natural ecosystems operate themselves under natural conditions.
Based on habitat types, it can be further classified into three types.

1. Terrestrial ecosystem

This ecosystem is related to land.

Example

Grassland ecosystem, forest ecosystem, desert ecosystem, etc.,

2. Aquatic ecosystem

This ecosystem is related to water. It is further sub classified into two types based on salt content.

- Fresh water ecosystem

(i)Running water ecosystems.

Examples

Rivers, Streams

(b) Standing water ecosystems

Examples

Pond, lake

(ii) Marine ecosystem

Example :

Seas and sea shores

Man – made (or) Artificial ecosystems

Artificial ecosystem is operated (or) maintained by man himself.

Example

Croplands, gardens

FOREST ECOSYSTEM

Introduction

A forest ecosystem is the one in which a tall and trees grow that support many animals and birds. The forest are found in undisturbed areas receiving moderate to hi rainfall. The forest occupies nearly 40% of the world's land area. In India it occupies only 19% of its total land area.

Types of forest ecosystem

Depending upon the climate conditions, forests can be classified into the following types.

1. Tropical Rain forests.
2. Tropical deciduous forests.
3. Tropical scrub forests.
4. Temperate rain forests.
5. Temperate deciduous forests.

Features of different. types of Forests

1. **Tropical Rain forests**

They are foi.ind near the equator. They are characterized by high temperature. They have broad leaf trees like teak and 1. and the animals like lion, tiger and monkey.

2. **Tropical deciduous forests**

They are found little away from the equator. They are characterized by a warm climate and rain is only during monsoon. They have different types of deciduous trees like maple, oak and hickary and animals like deer, fox, rabbit and rat.

3. Tropical Scrub forests

These are characterized by a dry climate for longer time. They small deciduous trees and shrubs and animals like maple, oak and hickory and animals like deer, fox, etc.,

4. Temperate Rain Forests

They are found in temperate areas with adequate rainfall. They are characterized by coniferous trees like pines, firs, red wood etc., and animals like, squirrels, fox, cats, bear etc.,

5. **Temperate deciduous forests**

They are found in areas with moderate temperatures. have major trees including broad leaf deciduous trees like oak, hickory and animals like deer, fox, bear, etc.,

Characteristics of forest ecosystems

1. Forests are characterized by warm temperature and adequate rainfall, which make the
2. generation of number of ponds, lakes etc.,
3. The forest maintains climate and rainfall.
4. The forest support many wild animals and protect biodiversity.
5. The soil is rich in organic matter and nutrients which support the growth of trees.
6. Since penetration of light is so poor, the conversion of organic matter into nutrients is very fast.

GRASSLAND ECOSYSTEM.

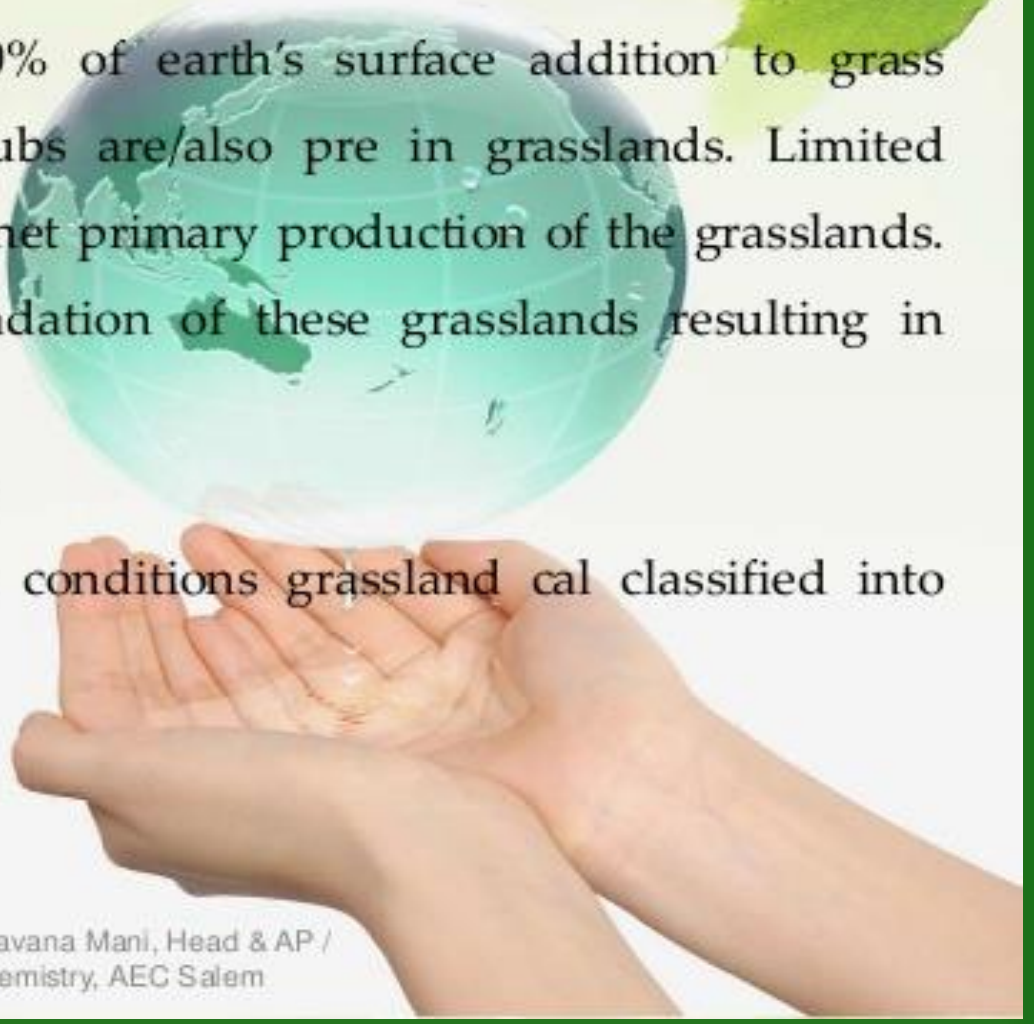
Introduction

Grassland occupies about 20% of earth's surface addition to grass species, some trees and shrubs are/also pre in grasslands. Limited grazing helps to improve the net primary production of the grasslands. But, overgrazing leads degradation of these grasslands resulting in desertification

Types of grassland ecosystem

Depending upon the climate conditions grassland cal classified into three types

1. Tropical grasslands.
2. Temperate grasslands.
3. Polar grasslands.



V.S.Saravana Mani, Head & AP / Chemistry, AEC Salem

Features of different types of grassland

1. Tropical grasslands

They are found near the borders of tropical rain . forests. are characterized by high temperature and moderate rainfall (40 to 100 cm). It is also known as Savanna type. They ye tall grasses with scattered shrubs and stunted trees and animals like zebras, giraffes, antelopes, etc.,

2. Temperate grasslands

They are usually found in the centers of continents, oil sloped hills.. They are characterized by very cold winters and hot summers: Intense grazing and summer fires, do not W shrubs or trees to grow.

3. Polar grasslands

They are found in arctic polar regions. They are characterized by severe cold and strong winds along with ice and snow. In summers several small annual plants grow. They ‘e animals like arctic wolf, weasel, arctic fox, etc.,

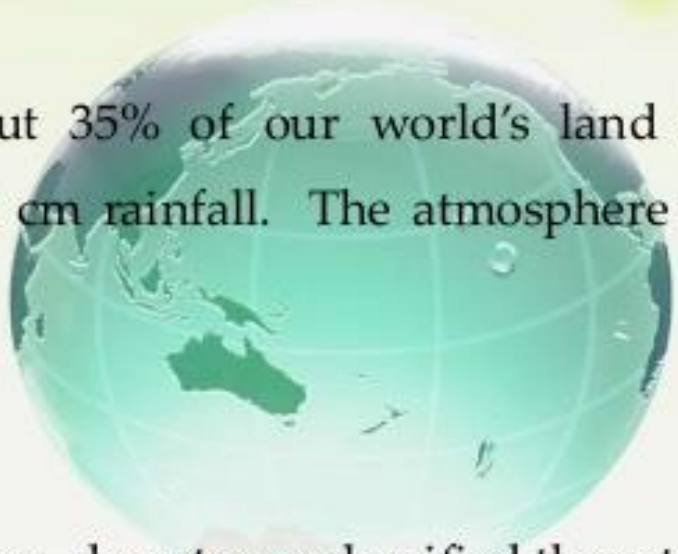
Characteristics of Grassland Ecosystems

Grassland ecosystem is a plain land occupied by grasses. Soil is very rich in nutrients and organic matter. Since it has tall grass, it is ideal place for grazing animals. It is characterized by low or uneven rainfall.

DESERT. ECOSYSTEMS

Introduction

Desert occupies about 35% of our world's land area. It is characterized by less than 25 cm rainfall. The atmosphere is dry and hence it is a poor insulator .



Types of desert ecosystems

Based on the climatic conditions, deserts are classified three types.

1. Tropical deserts.
2. Temperate deserts.
3. Cold deserts.

Features of different types of deserts

1. Tropical deserts: Tropical deserts are found in

- Africa: Sahara desert.
- Rajasthan: Thar desert.

They are characterized by only few species. Wind blow sand dunes are very common.

2. Temperate deserts

They are found in

South California: Majave.

They are characterized by very hot summer and very Winter time.

3. Cold deserts

They are found in -

China: Gobi desert.

They . are characterized by cold winters and was summers.

AQUATIC ECOSYSTEMS

The aquatic ecosystem deals with water bodies. The major types of organism found in aquatic environments are determined by the water's salinity.

Types of aquatic life zone

Aquatic life zones are divided into two types.

- Fresh water life zones

  Examples : Pounds, streams, lakes, rivers.

- Salt water life zones

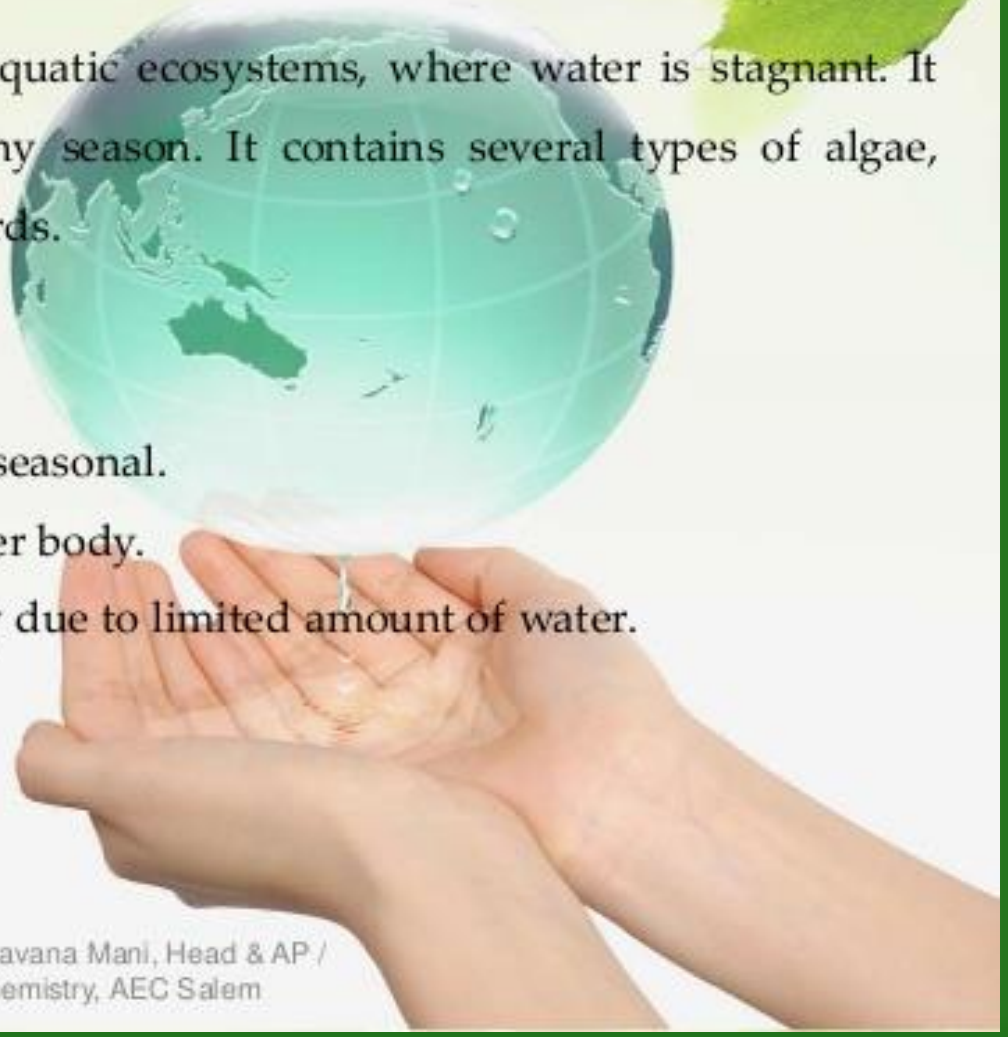
  Examples : Oceans, estuaries.

FRESH WATER ECOSYSTEM

POND ECOSYSTEMS

Introduction

A pond is a fresh water aquatic ecosystems, where water is stagnant. It receives enough water during rainy season. It contains several types of algae, aquatic plants, insects, fishes and birds.



Characteristics of pond

- Pond is temporary, only seasonal.
- It is a stagnant fresh water body.
- Ponds get polluted easily due to limited amount of water.

V.S.Saravana Mani, Head & AP / Chemistry, AEC Salem

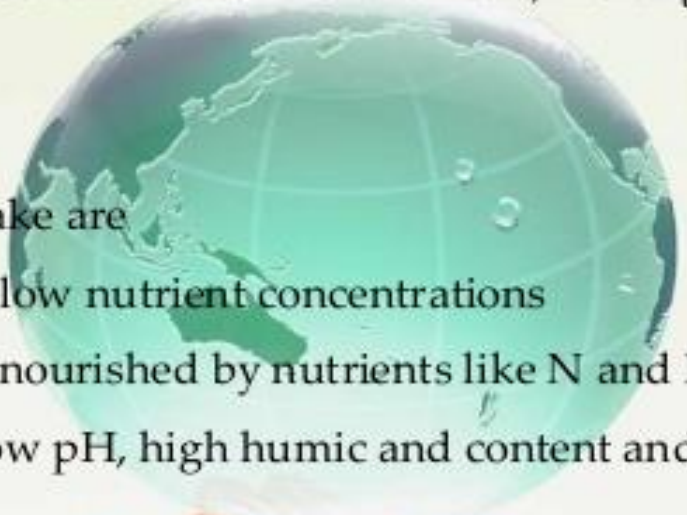
LAKE ECOSYSTEM

Lakes are large natural shallow water bodies. Lakes are used for various purposes. Lakes are supplied with water from rainfall, melting snow and streams.

Types of lakes

Some important types of lake are

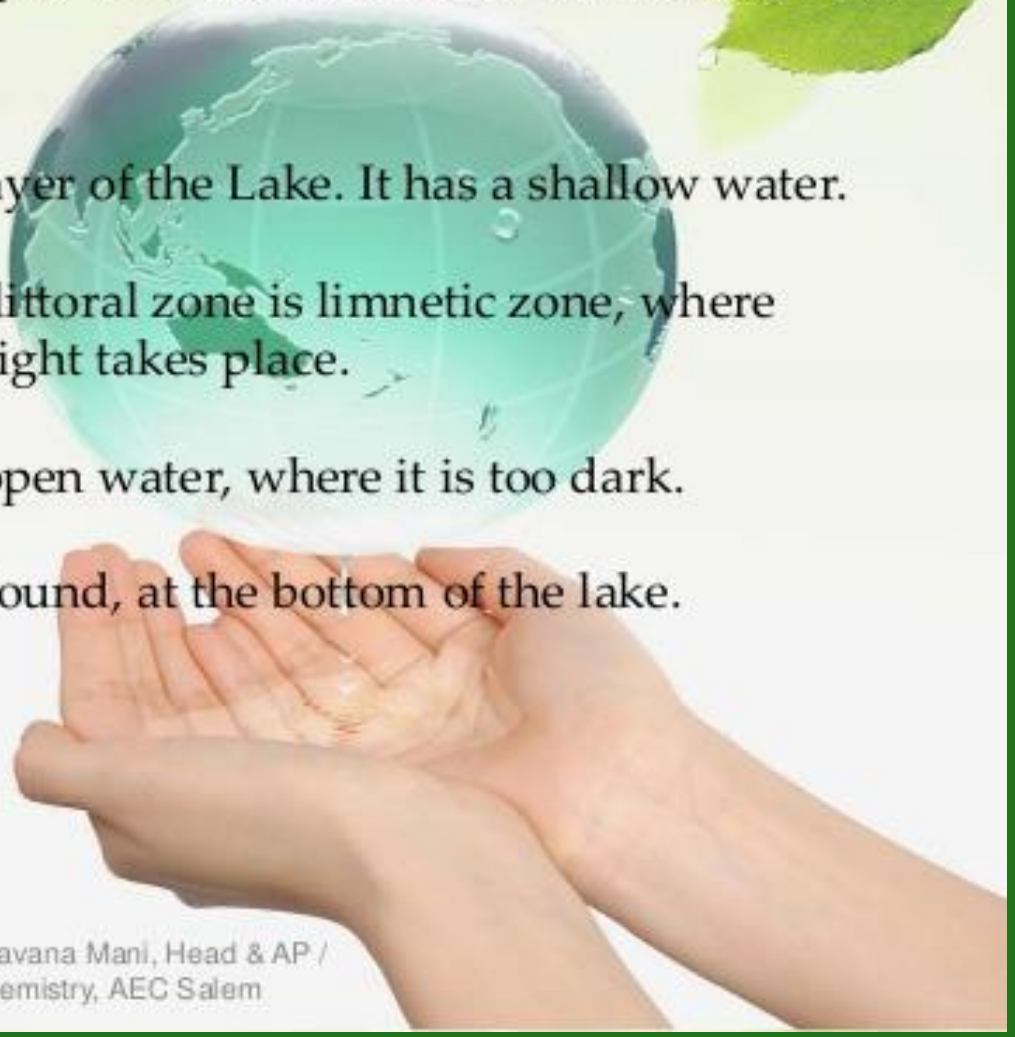
- Oligotrophic lakes : They have low nutrient concentrations
- Eutrophic lakes : They are overnourished by nutrients like N and P
- Dystrophic lakes : They have low pH, high humic and content and brown waters.
- Volcanic lakes : They receive water from magma after volcanic



Zones of Lake

Depending upon their depth and distance from the shore, likes consists of four distinct zones.

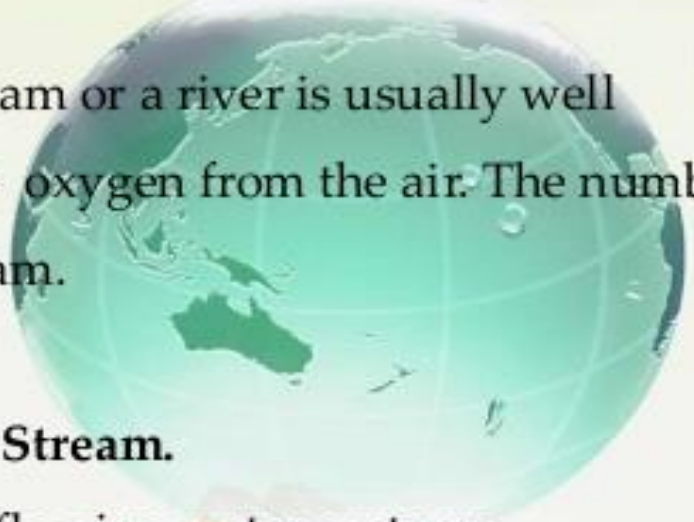
1. Liftoai zones: It is the top layer of the Lake. It has a shallow water.
2. Lininetic zone: Next to the littoral zone is limnetic zone, where effect penetration of solar. light takes place.
3. Préfundal zone: The deep open water, where it is too dark.
4. Benthic zone: This zone is found, at the bottom of the lake.



RIVER (or) STREAM ECOSYSTEM

Introduction

The running water of a stream or a river is usually well oxygenated, because it absorb's oxygen from the air. The number of animals are low in river or stream.



Characteristics of River or Stream.

- It is a fresh water, and free flowing water systems.
- Due to mixing of water, dissolved oxygen content is. more.
- River deposits large amount of nutrients.

SALT WATER ECOSYSTEMS.

OCEAN (MARINE) ECOSYSTEMS

Introduction

Oceans cover more than two thirds of the earth's surface. ocean environment is characterized by its high concentration of salts and minerals. It supplies huge variety of products and drugs. It also provides us iron, magnesium, iron, natural gas.

Zones of Oceans

The oceans have two major life zones.

(a) Coastal zone: It is relatively warm, nutrient rich shallow water. It has high primary productivity because of high nutrients and sunlight.

(b) Open sea: It is the deeper part of the ocean. It is vertically divided into three regions.

(i) Euphotic zone: It receives abundant light and shows high photosynthetic

(ii) Bathyal zone: It receives dim light and is usually geologically active.

(iii) Abyssal zone: It is the dark zone and is very deep (2000 to metres).

ESTUARINE ECOSYSTEM

Introduction

An estuary is a partially enclosed coastal area at the' mouth of a river, where sea water mixes with freshwater. It is strongly affected by tidal action. Estuaries are generally : abundant of nutrients. Estuaries are useful to human beings due to their high food potential. It is essential to protect the estuaries from pollution.

Characteristics of Estuarine ecosystem

1. Estuaries are transition zones, which are strongly affected by tides of the sea.
2. Water characteristics are periodically changed.
3. The living organism in estuarine ecosystems have wide tolerance.
4. Salinity remains highest during the summer and lowest during the winter.