



VAAGESWARI COLLEGE OF ENGINEERING

Beside L.M.D Police Station, Ramakrishna Colony, Thimmapur, Karimnagar

(Approved by AICTE New Delhi & Affiliated to JNTU Hyderabad)

1.3.1:

COURSE FILES:

1. ENVIRONMENTAL SCIENCE
2. INTELLECTUAL PROPERTY RIGHTS
3. GENDER SENSITIZATION
4. CONSTITUTION OF INDIA



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ENVIRONMENTAL SCIENCE

NOTES

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&
K.RAJESH

VAAGESWARI

B.Tech. I Year I Sem.**Course Objectives:**

- Understanding the importance of ecological balance for sustainable development.
- Understanding the impacts of developmental activities and mitigation measures.
- Understanding the environmental policies and regulations

Course Outcomes:

- Based on this course, the Engineering graduate will understand /evaluate / develop technologies on the basis of ecological principles and environmental regulations which in turn helps in sustainable development

UNIT-I

Ecosystems: Definition, Scope, and Importance of ecosystem. Classification, structure, and function of an ecosystem, Food chains, food webs, and ecological pyramids. Flow of energy, Biogeochemical cycles, Bioaccumulation, Biomagnification, ecosystem value, services and carrying capacity, Field visits.

UNIT-II

Natural Resources: Classification of Resources: Living and Non-Living resources, **water resources:** use and over utilization of surface and ground water, floods and droughts, Dams: benefits and problems. **Mineral resources:** use and exploitation, environmental effects of extracting and using mineral resources, **Land resources:** Forest resources, **Energy resources:** growing energy needs, renewable and non-renewable energy sources, use of alternate energy source, case studies.

UNIT-III

Biodiversity and Biotic Resources: Introduction, Definition, genetic, species and ecosystem diversity. Value of biodiversity; consumptive use, productive use, social, ethical, aesthetic and optional values. India as a mega diversity nation, Hot spots of biodiversity. Field visit. Threats to biodiversity: habitat loss, poaching of wildlife, man-wildlife conflicts; conservation of biodiversity: In-Situ and Ex-situ conservation. National Biodiversity act.

UNIT-IV

Environmental Pollution and Control Technologies: Environmental Pollution: Classification of pollution, **Air Pollution:** Primary and secondary pollutants, Automobile and Industrial pollution, Ambient air quality standards. **Water pollution:** Sources and types of pollution, drinking water quality standards. **Soil Pollution:** Sources and types, Impacts of modern agriculture, degradation of soil. **Noise Pollution:** Sources and Health hazards, standards, **Solid waste:** Municipal Solid Waste management, composition and characteristics of e-Waste and its management. **Pollution control technologies:** Wastewater Treatment methods: Primary, secondary and Tertiary. Overview of air pollution control technologies, Concepts of bioremediation. **Global Environmental Issues and Global Efforts:** Climate change and impacts on human environment. Ozone depletion and Ozone depleting substances (ODS). Deforestation and desertification. International conventions / Protocols: Earth summit, Kyoto protocol, and Montréal Protocol. NAPCC-GoI Initiatives.

UNIT-V

Environmental Policy, Legislation & EIA: Environmental Protection act, Legal aspects Air Act- 1981, Water Act, Forest Act, Wild life Act, Municipal solid waste management and handling rules, biomedical waste management and handling rules, hazardous waste management and handling rules. EIA: EIA structure, methods of baseline data acquisition. Overview on Impacts of air, water, biological and Socio economical aspects. Strategies for risk assessment, Concepts of Environmental Management Plan (EMP). **Towards Sustainable Future:** Concept of Sustainable Development Goals, Population and its explosion, Crazy Consumerism, Environmental Education, Urban Sprawl, Human health, Environmental Ethics, Concept of Green Building. Ecological Foot Print, Life Cycle assessment (LCA), Low carbon life style.

TEXT BOOKS:

- 1 Textbook of Environmental Studies for Undergraduate Courses by Erach Bharucha for University Grants Commission.
- 2 Environmental Studies by R. Rajagopalan, Oxford University Press.

REFERENCE BOOKS:

1. Environmental Science: towards a sustainable future by Richard T. Wright. 2008 PHI Learning Private Ltd. New Delhi

Learning Pvt. Ltd.

- 3. Environmental Science by Daniel B. Botkin & Edward A. Keller, Wiley INDIA edition.
- 4. Environmental Studies by Anubha Kaushik, 4th Edition, New age international publishers.
- 5. Text book of Environmental Science and Technology - Dr. M. Anji Reddy 2007, BS Publications.
- 6. Introduction to Environmental Science by Y. Anjaneyulu, BS. Publications.

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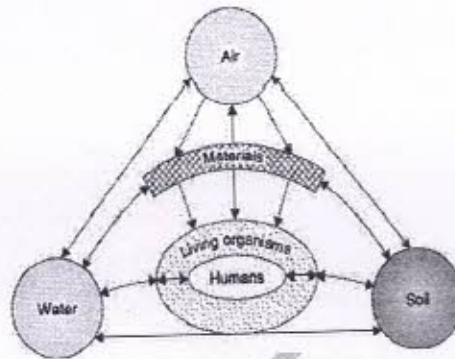
Unit 1: Ecosystems

Introduction

'Environment' is derived from the French word Environment which means to encircle or surround.

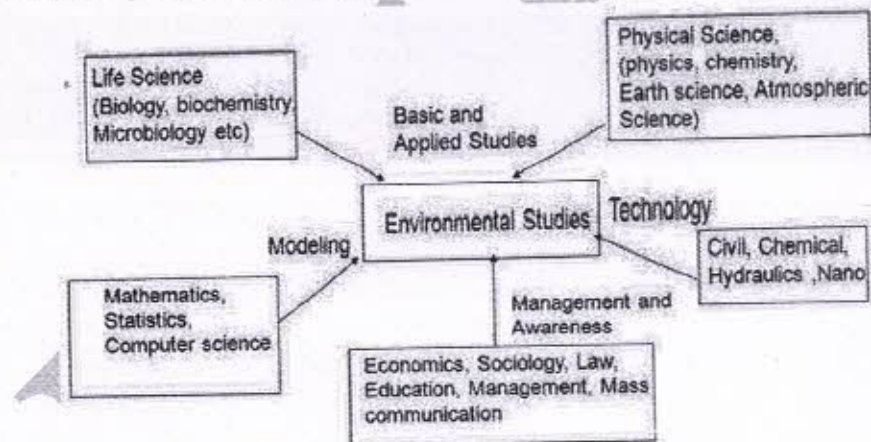
All the biological and non-biological things surrounding an organism are thus included in environment.

Environment is Thus defined as "the sum total of water, air and land, inter-relationships that exist among them and with the human beings, other living organisms and property".



Multidisciplinary nature of environmental studies

Thus, in order to study environment, one needs knowledge inputs from various disciplines.



- Life Sciences including Botany, Zoology, Microbiology, Genetics, Biochemistry and Biotechnology help in understanding the biotic component and their interactions.
- The physical and chemical structure of the abiotic components and energy transfer and flow are understood with the help of basic concepts of Physics, Chemistry, Geology, Atmospheric Science, Oceanography and Geography.
- Mathematics, Statistics and Computer Science serve as effective tools in environmental modelling and management.
- Subjects like Education, Economics, Sociology and Mass communication provide the inputs for dealing with the socio-economic aspects associated with various developmental activities.
- A synthesis with Environmental Engineering, Civil Engineering, Hydraulics and Chemical Engineering form the basis for various technologies dealing with the control of environmental pollution, waste-treatment and development of cleaner technologies that are important for protection of the environment.
- Environmental laws provide the tools for effective management and protection of the environment.

Environmental Studies, therefore, is a multidisciplinary subject where different aspects are dealt with a holistic approach

Ecosystems:

The term Ecology was coined by Earnst Haeckel in 1869. It is derived from the Greek words Oikos- home + logos- study. So, ecology deals with the study of organisms in their natural home interacting with their surroundings. The surroundings or environment consists of other living organisms (biotic) and physical (abiotic) components. Modern ecologists believe that an adequate definition of ecology must specify some unit of study and one such basic unit described by Tansley (1935) was ecosystem. "An ecosystem is a group of biotic communities of species interacting with one another and with their non-living environment exchanging energy and matter". Now ecology is often defined as "the study of ecosystems".

An ecosystem is an integrated unit consisting of interacting plants, animals and microorganisms whose survival depends upon the maintenance and regulation of their biotic and abiotic structures and functions.

The ecosystem is thus, a unit or a system which is composed of a number of subunits, that are all directly or indirectly linked with each other. They may be freely exchanging energy and matter from outside—an open ecosystem or may be isolated from outside—a closed ecosystem

ECOSYSTEM CHARACTERISTICS

Ecosystems show large variations in their size, structure, composition etc. However, all the ecosystems are characterized by certain basic **structural** and **functional** features which are common.

STRUCTURAL FEATURES

Composition and organization of biological communities and abiotic components constitute the structure of an ecosystem.

1. Biotic Structure

The plants, animals and microorganisms present in an ecosystem form the biotic component.

(a) Producers: They are mainly the green plants, which can synthesize their food themselves by making use of carbon di oxide present in the air and water in the presence of sunlight by involving chlorophyll, the green pigment present in the leaves, through the process of photosynthesis. They are also known as *photo autotrophs* (auto=self; troph=food, photo=light).

There are some microorganisms also which can produce organic matter to some extent through oxidation of certain chemicals in the absence of sunlight. They are known as chemosynthetic organisms or chemo-autotrophs. For instance, in the ocean depths, where there is no sunlight, chemoautotrophic sulphur bacteria make use of the heat generated by the decay of radioactive elements present in the earth's core and released in ocean's depths. They use this heat to convert dissolved hydrogen sulphide (H_2S) and carbon dioxide (CO_2) into organic compounds.

(b) Consumers: All organisms which get their organic food by feeding upon other organisms are called consumers, which are of the following types:

(i) Herbivores (plant eaters): They feed directly on producers and hence also known as primary consumers. e.g. rabbit, insect, man.

(ii) Carnivores (meat eaters): They feed on other consumers. If they feed on herbivores they are called secondary consumers (e.g. frog) and if they feed on other carnivores (snake, big fish etc.) they are known as tertiary carnivores/consumers.

(iii) Omnivores: They feed on both plants and animals. e.g. humans, rat, fox, many birds.

(iv) Detritivores (Detritus feeders or Saprotrophs): They feed on the parts of dead organisms, wastes of living organisms, their cast-offs and partially decomposed matter e.g. beetles, termites, ants, crabs, earthworms etc.

(c) Decomposers: They derive their nutrition by breaking down the complex organic molecules to simpler organic compounds and ultimately into inorganic nutrients. Various bacteria and fungi are decomposers.

In all the ecosystems, this biotic structure prevails. However, in some, it is the primary producers which predominate (e.g. in forests, agroecosystems) while in others the decomposers predominate (e.g. deep ocean).

II. Abiotic Structure

The physical and chemical components of an ecosystem constitute its abiotic structure. It includes climatic factors, edaphic (soil) factors, geographical factors, energy, nutrients and toxic substances.

(a) Physical factors: The sunlight and shade, intensity of solar flux, duration of sun hours, average temperature, maximum-minimum temperature, annual rainfall, wind, latitude and altitude, soil type, water availability, water currents etc. are some of the important physical features which have a strong influence on the ecosystem.

We can clearly see the striking differences in solar flux, temperature and precipitation (rainfall, snow etc.) pattern in a desert ecosystem, in a tropical rainforest and in tundra ecosystem.

(b) Chemical factors: Availability of major essential nutrients like carbon, nitrogen, phosphorus, potassium, hydrogen, oxygen and sulphur, level of toxic substances, salts causing salinity and various organic substances present in the soil or water largely influence the functioning of the ecosystem.

FUNCTIONAL FEATURES

Every ecosystem performs under natural conditions in a systematic way. It receives energy from the sun and passes it on through various biotic components and in fact, all life depends upon this flow of energy.

The major functional attributes of an ecosystems are as follows:

- (i) Food chain, food webs and trophic structure.
- (ii) Energy flow.
- (iii) Cycling of nutrients (Biogeochemical cycles).
- (iv) Primary and Secondary production.
- (v) Ecosystem development and regulation.

Trophic structure: The structure and functions of the ecosystem are interrelated and influence each other. The flow of energy is mediated through a series of feeding relationships in a definite sequence or pattern which is known as Food chain. Nutrients too move along the food chain. The producers and consumers are arranged in an ecosystem in a definite manner and their interaction along with the population size is expressed together as Trophic structure. Each food level is known as Trophic level and the amount of living matter at each Trophic level at a given time is known as **standing crop or standing biomass**.

(i) FOOD CHAINS

- **The sequence of eating and being eaten in an ecosystem** is known as food chain.
- All organisms, living or dead, are potential food for some other organism and thus, there is essentially no waste in the functioning of a natural ecosystem.

Some common examples of simple food chains are:

Grass → grasshopper → Frog → Snake → Hawk (Grassland ecosystem)

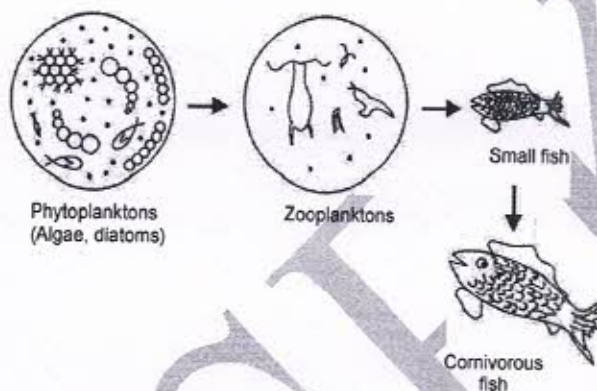
Phytoplankton's → water fleas → small fish → Tuna (Pond ecosystem)

Each organism in the ecosystem is assigned a feeding level or trophic level depending on its nutritional status. Thus, in the grassland food chain, grasshopper occupies the Ist trophic level, frog the IInd and snake and hawk occupy the IIIrd and the IVth trophic levels, respectively.

The decomposers consume the dead matter of all these trophic levels. In nature, we come across two major types of food chains.

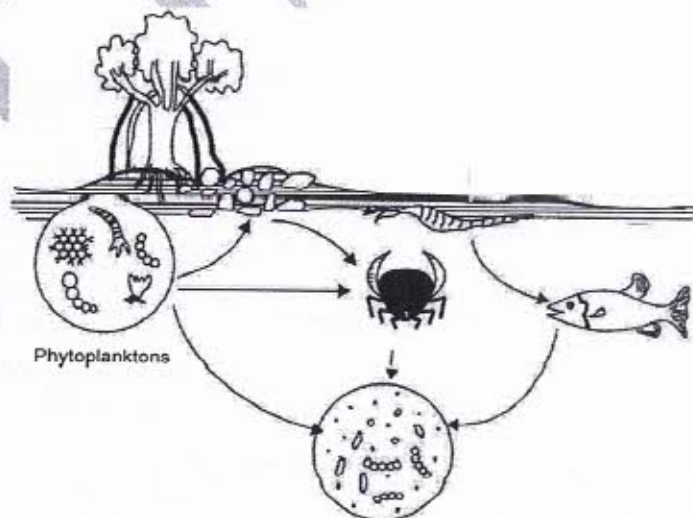
1. Grazing food chain: It **starts with green plants** (primary producers) and culminates in carnivores. All the examples cited above show this type of food chain. Another example could be

Grass → Rabbit → Fox



A grazing food chain in a pond ecosystem

2. Detritus food chain: It **starts with dead organic matter** which the detritivores and decomposers consume. Partially decomposed dead organic matter and even the decomposers are consumed by detritivores and their predators. An example of the detritus food chain is seen in a Mangrove (estuary)



Decomposers (Bacteria, fungi)

A detritus food chain in an estuary based on dead leaves of mangrove trees

Leaf litter → algae → crabs → small carnivorous fish → large carnivorous fish (Mangrove ecosystem)

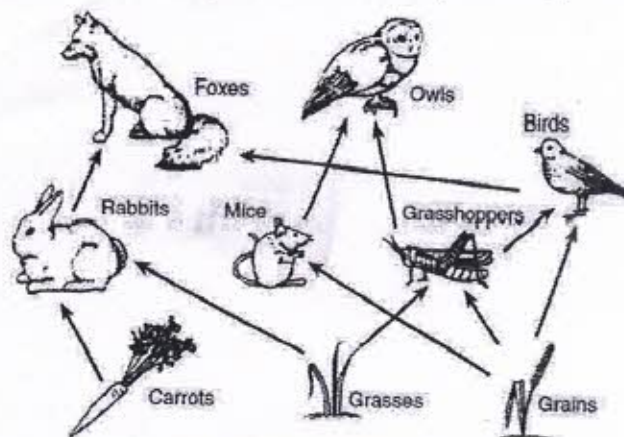
Dead organic matter → fungi → bacteria (Forest ecosystem)

FOOD WEB

Food chains in ecosystems are rarely found to operate as isolated linear sequences. Rather, they are found to be interconnected and usually form a complex network with several

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linkages and are known as food webs. Thus, “food web is a **network of food chains** where different types of organisms are connected at different trophic levels, so that there are a number of options of eating and being eaten at each trophic level.”



(Not drawn to scale)

Significance of food chains and food webs

Food chains and food webs play a very significant role in the ecosystem because the two most important functions of energy flow and nutrient cycling take place through them.

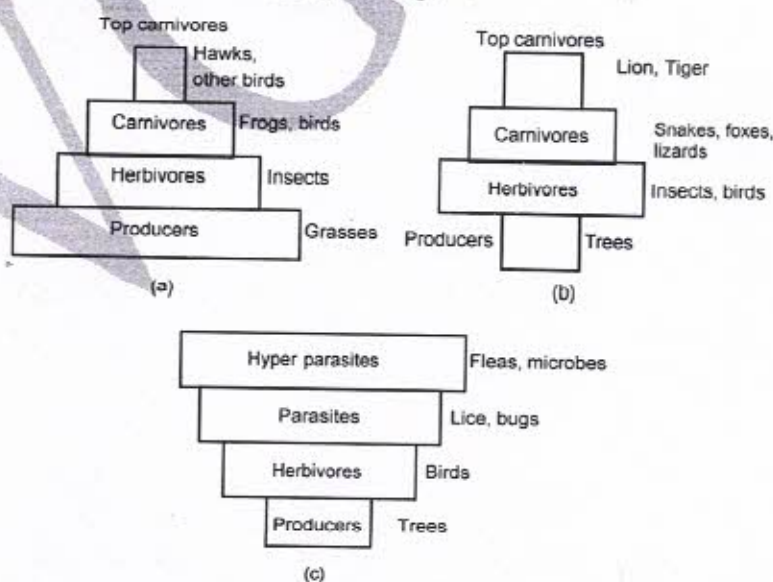
- The food chains also help in maintaining and regulating the population size of different animals and thus, help maintain the ecological balance.
- Food chains show a unique property of biological magnification of some chemicals.

ECOLOGICAL PYRAMIDS

Graphic representation of trophic structure and function of an ecosystem, starting with producers at the base and successive trophic levels forming the apex is known as an ecological pyramid.

Ecological pyramids are of three types:

a) Pyramid of numbers: It represents the number of individual organisms at each trophic level. We may have upright or inverted pyramid of numbers, depending upon the type of ecosystem and food chain as shown in below Fig.

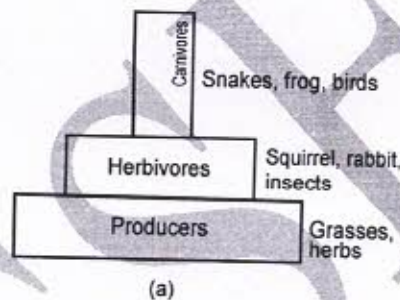


- A grassland ecosystem (Fig. a) and a pond ecosystem show an upright pyramid of numbers. The producers in the grasslands are grasses and that in a pond are phytoplanktons (algae etc.), which are small in size and very large in number. So the producers form a broad base. The herbivores in a grassland are insects while tertiary

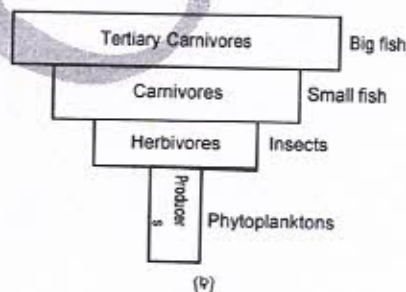
carnivores are hawks or other birds which are gradually less and less in number and hence the pyramid apex becomes gradually narrower forming an upright pyramid.

- In a forest ecosystem (Fig. b), big trees are the producers, which are less in number and hence form a narrow base. A larger number of herbivores including birds, insects and several species of animals feed upon the trees (on leaves, fruits, flowers, bark etc.) and form a much broader middle level. The secondary consumers like fox, snakes, lizards etc. are less in number than herbivores while top carnivores like lion, tiger etc. are still smaller in number. So the pyramid is narrow on both sides and broader in the middle.
- Parasitic food chain shows (Fig. c) an inverted pyramid of number. The producers like a few big trees harbour fruit eating birds acting like herbivores which are larger in number. A much higher number of lice, bugs etc. grow as parasites on these birds while a still greater number of hyper parasites like bugs, fleas and microbes feed upon them, thus making an inverted pyramid.

b) Pyramid of biomass: It is based upon the total biomass (dry matter) at each trophic level in a food chain. The pyramid of biomass can also be upright or inverted.



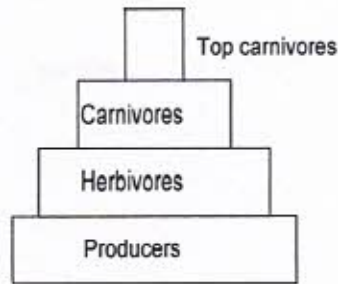
above Fig. (a, b) shows pyramids of biomass in a forest and an aquatic ecosystem. The pyramid of biomass in a forest is upright in contrast to its pyramid of numbers. This is because the producers (trees) accumulate a huge biomass while the consumers' total biomass feeding on them declines at higher trophic levels, resulting in broad base and narrowing top.



The pond ecosystem shows an inverted pyramid of biomass (Fig. b). The total biomass of producers (phytoplankton's) is much less as compared to herbivores (zooplanktons, insects), Carnivores (Small fish) and tertiary carnivores (big fish). Thus the pyramid takes an inverted shape with narrow base and broad apex

c) Pyramid of Energy: The amount of energy present at each trophic level is considered for this type of pyramid. Pyramid of energy gives the best representation of the trophic relationships and it is always upright.

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At every successive trophic level, there is a huge loss of energy (about 90%) in the form of heat, respiration etc. Thus, at each next higher level only 10% of the energy passes on. Hence, there is a sharp decline in energy level of each successive trophic level as we move from producers to top carnivores. Therefore, the pyramid of energy is always upright as shown in Fig.

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Unit 2: Natural Resources

Life on this planet earth depends upon a variety of goods and services provided by the nature, which are known as Natural resources. Thus water, air, soil, minerals, coal, forests, crops and wildlife are all examples of natural resources. Any stock or reserve that can be drawn from nature is a Natural resources .

CLASSIFICATION OF RESOURCES

Resources can be classified in the following ways:

(A) Living and non-living resources

Living resources are biological resources that are used by human beings e.g. forests, croplands, animal resources.

Non-living resources are not derived from biological materials e.g. soil, land, water.

(B) Renewable and non-renewable resources

Renewable resources which are in exhaustive and can be regenerated within a given span of time e.g. forests, wildlife, wind energy, biomass energy, tidal energy, hydro power etc. Solar energy is also a renewable form of energy as it is an inexhaustible source of energy.

Non-renewable resources which cannot be regenerated in a time span e.g. Fossil fuels like coal, petroleum, minerals etc. Once we exhaust these reserves, the same cannot be replenished. Even our renewable resources can become non-renewable if we exploit them to such extent that their rate of consumption exceeds their rate of regeneration. For example, if a species is exploited so much that its population size declines below the threshold level then it is not able to sustain itself and gradually the species becomes endangered or extinct.

It is very important to protect and conserve our natural resources and use them in a judicious manner so that we do not exhaust them. It does not mean that we should stop using most of the natural resources. Rather, we should use the resources in such a way that we always save enough of them for our future generations.

WATER RESOURCES

Water is an indispensable natural resource on this earth on which. all life depends. About 97% of the earth's surface is covered by water and most of the animals and plants have 60-65% water in their body.

Water-A Unique Resource

Water is characterized by certain unique features which make it a marvelous resource:

- i. It exists as a liquid over a wide range of temperature i.e. from 0° to 100°C.
- ii. It has the highest specific heat, due to which it warms up and cools down very slowly without causing shocks of temperature jerks to the aquatic life.
- iii. It has a high latent heat of vaporization. Hence, it takes a huge amount of energy for getting vaporized. That's why it produces a cooling effect as it evaporates.
- iv. It is an excellent solvent for several nutrients. Thus, it can serve as a very good carrier of nutrients, including oxygen, which are essential for life. But, it can also easily dissolve various pollutants and become a carrier of pathogenic microorganisms.
- v. Due to high surface tension and cohesion it can easily rise through great heights through the trunk even in the tallest of the trees like *Sequoia*.
- vi. It has an anomalous expansion behavior i.e. as it freezes, it expands instead of contracting and thus becomes lighter. It is because of this property that even in extreme cold, the lakes freeze only on the surface. Being lighter the ice keeps floating, whereas the bottom waters remain at a higher temperature and therefore, can sustain aquatic organisms even in extreme cold.

DAMS- BENEFITS AND PROBLEMS

Big dams are often regarded as a symbol of national development. However, there are several other issues and problems related to these. Fig. 2.2 depicts various aspects associated with big dams.

BENEFITS OF DAMS

River valley projects with big dams have usually been considered to play a key role in the development process due to their multiple uses. India has the distinction of having the largest number of river-valley projects. The tribal's living in the area pin big hopes on these projects as they aim at providing employment and raising the standard and quality of life. The dams have tremendous potential for economic upliftment and growth. They can help in checking floods and famines, generate electricity and reduce water and power shortage, provide irrigation water to lower areas, provide drinking water in remote areas and promote navigation, fishery etc.

ENVIRONMENTAL PROBLEMS DUE TO DAMS

The environmental impacts of big-dams are also too many due to which very often the big dams become a subject of controversy. The impacts can be at the upstream as well as downstream levels.

(A) The upstream problems include the following:

- (i) Displacement of tribal people
- (ii) Loss of forests, flora and fauna
- (iii) Changes in fisheries and the spawning grounds
- (iv) Siltation and sedimentation of reservoirs
- (v) Loss of non-forest land
- (vi) Stagnation and waterlogging near reservoir
- (vii) Breeding of vectors and spread of vector-borne diseases
- (viii) Reservoir induced seismicity (RIS) causing earthquakes
- (ix) Growth of aquatic weeds.
- (x) Microclimatic changes.

(B) The downstream impacts include the following:

- (i) Water logging and salinity due to over irrigation
- (ii) Micro-climatic changes
- (iii) Reduced water flow and silt deposition in river
- (iv) Flash floods
- (v) Salt water intrusion at river mouth

(vi) Loss of land fertility along the river since the sediments carrying nutrients get deposited in the reservoir

(vii) Outbreak of vector-borne diseases like malaria

Thus, although dams are built to serve the society with multiple uses, but it has several serious side-effects. That is why now there is a shift towards construction of small dams or mini-hydel projects.

FOREST RESOURCES

Forests are one of the most important natural resources on this earth. Covering the earth like a green blanket these forests not only produce innumerable material goods, but also provide several environmental services which are essential for life.

About 1/3rd of the world's land area is forested which includes closed as well as open forests.

Uses of Forests

Commercial uses: Forests provide us a large number of commercial goods which include timber, firewood, pulpwood, food items, gum, resins, non-edible oils, rubber, fibers, lac,

bamboo canes, fodder, medicine, drugs and many more items.

Half of the timber cut each year is used as fuel for heating and cooking. One third of the wood harvest is used for building materials as lumber, plywood and hardwood, particle board and chipboard. One sixth of the wood harvest is converted into pulp and used for paper industry. Many forest lands are used for mining, agriculture, grazing, and recreation and for development of dams.

Ecological uses: While a typical tree produces commercial goods worth about \$ 590 it provides environmental services worth nearly \$ 196, 250.

The ecological services provided by our forests may be summed up as follows:

Production of oxygen: The trees produce oxygen by photo-synthesis which is so vital for life on this earth. They are rightly called as earth's lungs.

Reducing global warming: The main greenhouse gas carbon dioxide (CO₂) is absorbed by the forests as a raw material for photosynthesis. Thus forest canopy acts as a sink for CO₂ thereby reducing the problem of global warming caused by greenhouse gas CO₂

Wild life habitat: Forests are the homes of millions of wild animals and plants. About 7 million species are found in the tropical forests alone.

Regulation of hydrological cycle: Forested watersheds act like giant sponges, absorbing the rainfall, slowing down the runoff and slowly releasing the water for recharge of springs. About 50-80 %of the moisture in the air above tropical forests comes from their transpiration which helps in bringing rains.

Soil Conservation: Forests bind the soil particles tightly in their roots and prevent soil erosion. They also act as wind-breaks.

Pollution moderators: Forests can absorb many toxic gases and can help in keeping the air pure. They have also been reported to absorb noise and thus help in preventing air and noise pollution.

DEFORESTATION

Deforestation is the permanent destruction of forests in order to make the land available for other uses. Some other statistics

Major Causes of Deforestation

(i) Shifting cultivation: There are an estimated 300 million people living as shifting cultivators who practice slash and burn agriculture and are supposed to clear more than 5 lakh ha of forests for shifting cultivation annually. In India, we have this practice in North-East and to some extent in Andhra Pradesh, Bihar and M.P which contribute to nearly half of the forest clearing annually.

(ii) Fuel requirements: Increasing demands for fuel wood by the growing population in India alone has shot up to 300-500 million tons in 2001 as compared to just 65 million tons during independence, thereby increasing the pressure on forests.

(iii) Raw materials for industrial use: Wood for making boxes, furniture, railway-sleepers, plywood, match-boxes, pulp for paper industry etc. have exerted tremendous pressure on forests. Plywood is in great demand for packing tea for Tea industry of Assam while fir tree wood is exploited greatly for packing apples in J&K.

(iv) Development projects: Massive destruction of forests occur for various development projects like hydroelectric projects, big dams, road construction, mining etc.

(v) Growing food needs: In developing countries this is the main reason for deforestation. To meet the demands of rapidly growing population, agricultural lands and settlements are created permanently by clearing forests.

(vi) Overgrazing: The poor in the tropics mainly rely on wood as a source of fuel leading to loss of tree cover and the cleared lands are turned into the grazing lands. Overgrazing by the cattle leads to further degradation of these lands.

Major Consequences of Deforestation

Deforestation has far reaching consequences, which may be outlined as follows:

(i) It threatens the existence of many wild life species due to destruction of their natural habitat

(ii) Biodiversity is lost and along with that genetic diversity is eroded.

(iii) Hydrological cycle gets affected, thereby influencing rainfall.

(iv) Problems of soil erosion and loss of soil fertility increase.

(v) In hilly areas it often leads to landslides

ENERGY RESOURCES

Energy consumption of a nation is usually considered as an index of development. This is because almost all the developmental activities directly or indirectly dependent upon energy. We find wide disparities per capita energy use between the developed and the developing nations.

The first form of energy technology probably was the fire, which produced heat and the early man used it for cooking and heating purposes. Wind and hydropower have also been in use for the last 10,000 years. The invention of steam engines replaced the burning of wood by coal and coal was later replaced to a great extent by oil. In 1970's due to Iranian revolution and Arab oil embargo the prices of oil shot up. This ultimately led to exploration and use of several alternate sources of energy.

RENEWABLE AND NON-RENEWABLE ENERGY SOURCES

A source of energy is one that can provide adequate amount of energy in a usable form over a long period of time. These sources can be of two types:

(1) Renewable resources which can be generated continuously in nature and are inexhaustible e.g. wood, solar energy, wind energy, tidal energy, hydropower, biomass energy, bio-fuels, geo-thermal energy and hydrogen. They are also known as non-conventional sources of energy and they can be used again and again in an endless manner.

(2) Non-renewable resources which have accumulated in nature over a long span of time and cannot be quickly replenished when exhausted e.g. coal, petroleum, natural gas and nuclear fuels like uranium and thorium.

Wood is a renewable resource as we can get new wood by growing a sapling into a tree within 15-20 years but it has taken millions of years for the formation of coal from trees and cannot be regenerated in Our life time, hence coal is not renewable. We will now discuss various forms of renewable and non-renewable energy resource.

Renewable Energy Resources (Alternate Energy Resource)

Solar Energy: Sun is the ultimate source of energy, directly or indirectly for all other forms of energy. The nuclear fusion reactions occurring inside the sun release enormous quantities of energy in the form of heat and light. The solar energy received by the near earth space is approximately 1.4 kilojoules/ second/ m² known as solar constant.

Traditionally, we have been using solar energy for drying clothes and food-grains, preservation of eatables and for obtaining salt from sea water. Now we have several techniques for harnessing solar energy. Some important solar energy harvesting devices .

(i) **Solar heat collectors:** These can be passive or active in nature. Passive solar heat collectors are natural materials like stones, bricks etc. Or material like glass which absorb heat during the day time and release it slowly at night. Active solar collectors pump a heat absorbing medium (air or water) through a small collector which is normally placed on the top of the building.

(ii) **Solar cells:** They are also known as photovoltaic cells or PV cells. Solar cells are made of thin wafers of semi-conductor materials like silicon and gallium. When solar radiations fall on them, a potential difference is produced which causes flow of electrons and produces electricity. Silicon can be obtained from silica or sand, which is abundantly available and inexpensive. By using gallium arsenide, cadmium supplied or boron, efficiency of the PV cells can be improved. The potential difference produced by a single PV cell of 4 cm- size is about 0.4-0.5 volts and produces a current of 60 milli amperes

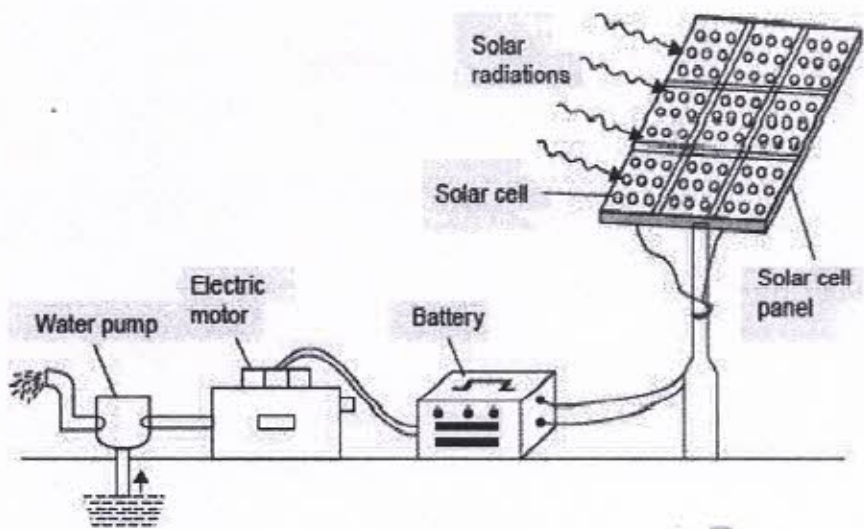


FIG 1 A solar pump run by electricity produced by solar cells.

A group of solar cells joined together in a definite pattern form a solar panel which can harness a large amount of solar energy and can produce electricity enough to run street-light, irrigation water pump etc.

Solar cells are widely used in calculators, electronic watches, street lighting, traffic signals, water pumps etc. They are also used in artificial satellites for electricity generation. Solar cells are used for running radio and television also. They are more in use in remote areas where conventional electricity supply is a problem.

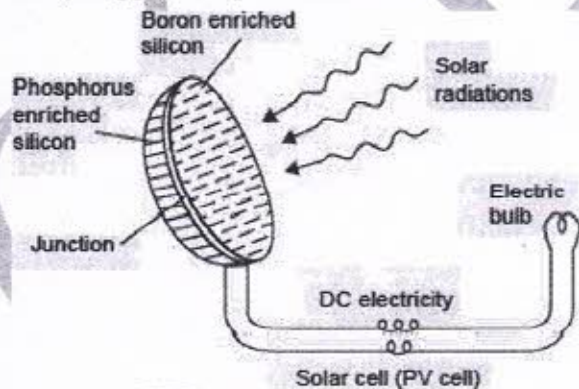


Fig 2 Solar cell.

(iii) **Solar cooker:** *Solar cookers make use of solar heat by reflecting the solar radiations using a mirror directly on to a glass sheet which covers the black insulated box within which the raw food is kept. A new design of solar cooker is now available which involves a spherical reflector (concave or parabolic reflector) instead of plane mirror that has more heating effect and hence greater efficiency.*

The food cooked in solar cookers is more nutritious due to slow heating. However, it has the limitation that it cannot be used at night or on cloudy days. Moreover, the direction of the cooker has to be adjusted according to the direction of the sun rays.


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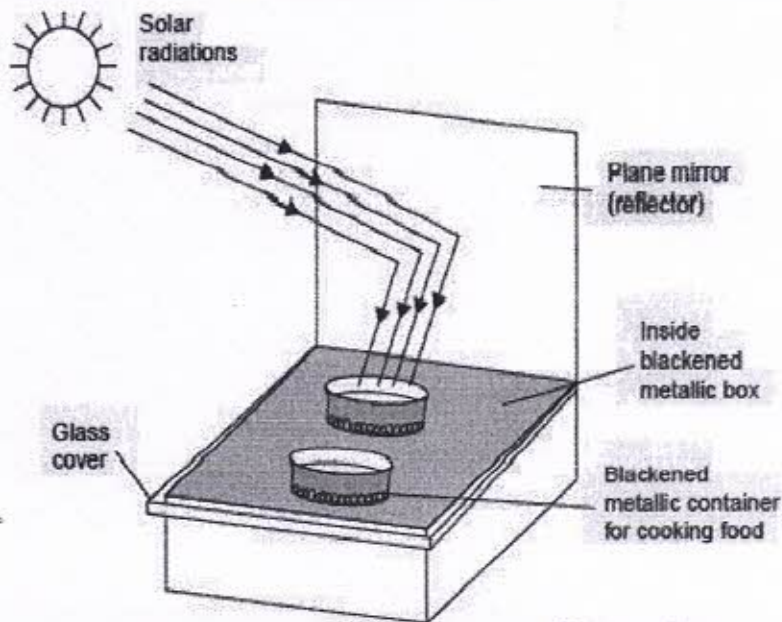


FIG 3 Simple box-type solar cooker.

Wind energy: The high speed winds have a lot of energy in them as kinetic energy due to their motion. The driving force of the winds is the sun. The wind energy is harnessed by making use of wind mills. The blades of the wind mill keep on rotating continuously due to the force of the striking wind. The rotational motion of the blades drives a number of machines like water pumps, flour mills and electric generators. A large number of wind mills are installed in clusters called wind farms, which feed power to the utility grid and produce a large amount of electricity. These farms are ideally located in coastal regions, open grasslands or hilly regions, particularly mountain passes and ridges where the winds are strong and steady. *The minimum wind speed required for satisfactory working of a wind generator is 15 km / hr.* *Natural Resources*

The wind power potential of our country is estimated to be about 20,000 MW, while at present we are generating about 1020 MW. The largest wind farm of our country is near Kanyakumari in Tamil Nadu generating 380 MW electricity.

Wind energy is very useful as it does not cause any air pollution. After the initial installation cost, the wind energy is very cheap. It is believed that by the middle of the century wind power would supply more than 10% of world's electricity.

Hydro power: The water flowing in a river is collected by constructing a big dam where the water is stored and allowed to fall from a height. The blades of the turbine located at the bottom of the dam move with the fast moving water which in turn rotate the generator and produces electricity. We can also construct mini or micro hydel power plants on the rivers in hilly regions for harnessing the hydro energy on a small scale, but the minimum height of the waterfalls should be 10 meters. The hydropower potential of India is estimated to be about 4×10^{11} KW-hours. Till now we have utilized only a little more than 11% of this potential.

Hydropower does not cause any pollution, it is renewable and normally the hydro power projects are multipurpose projects helping in controlling floods, used for irrigation, navigation etc. However, big dams are often associated with a number of environmental impacts .

Tidal energy: Ocean tides produced by gravitational forces of sun and moon contain enormous amounts of energy. The 'high tide' and 'low tide' refer to the rise and fall of water in the oceans. A difference of several meters is required between the height of high and low

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tide to spin the turbines. The tidal energy can be harnessed by constructing a tidal barrage. During high tide, the sea-water flows into the reservoir of the barrage and turns the turbine, which in turn produces electricity by rotating the generators. During low tide, when the sea-level is low, the sea water stored in the barrage reservoir flows out into the sea and again turns the turbines.

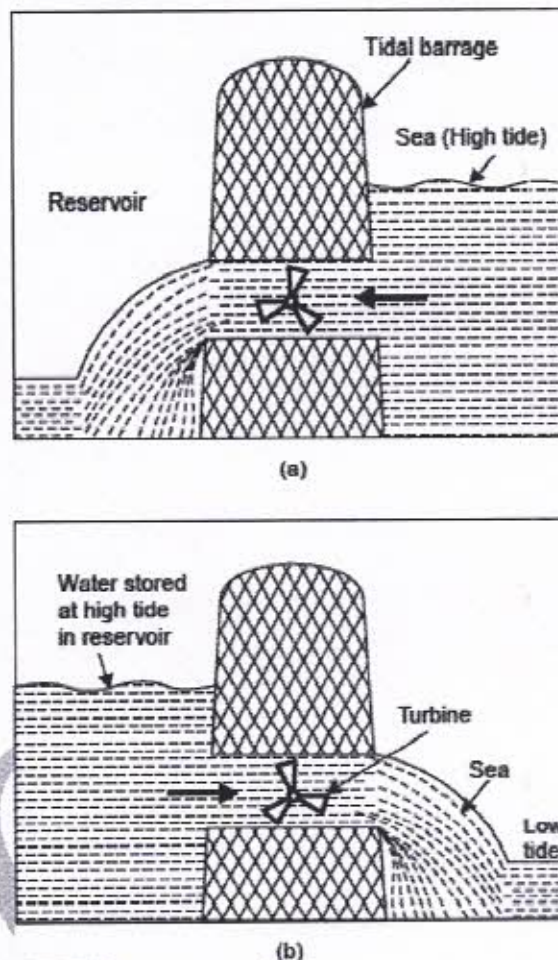


FIG 5 Water flows into the reservoir to turn the turbine at high tide (a), and flows out from the reservoir to the sea, again turning the turbine at low tide (b).

There are only a few sites in the world where tidal energy can be suitably harnessed. The Bay of Fundy, Canada having 17-18 m high tides has a potential of 5,000 MW of power generation. The tidal mill at La Rance, France is one of the first modern tidal power mill. In India, Gulf of Cambay, Gulf of Kutch and the Sunder ban deltas are the tidal power sites.

Non Renewable Energy Sources

These are the fossil fuels like coal, petroleum, natural gas and nuclear fuels. These were formed by the decomposition of the remains of plants and animals buried under the earth millions of years ago. The fuels are very precious because they have taken such a long time to be formed and if we exhaust their reserves at such a fast rate as we have been doing, ever since we discovered them, then very soon we will lose these resources forever.

Coal : Coal was formed 255-350 million years ago in the hot, damp regions of the earth during the carboniferous age. The ancient plants along the banks of rivers and swamps were buried after death into the soil and due to the heat and pressure gradually got converted into peat and coal over millions of years of time. There are mainly three types of coal, namely *anthracite* (hard coal), *bituminous* (soft coal) and *lignite* (brown coal). Anthracite coal has

maximum carbon (90%) and calorific value (8700 kcal/kg.) Bituminous, lignite and peat contain 80, 70 and 60% carbon, respectively. Coal is the most abundant fossil fuel in the world. *At the present rate of usage, the coal reserves are likely to last for about 200 years and if its use increases by 2% per year, then it will last for another 65 years.*

India has about 5% of world's coal and Indian coal is not very good in terms of heat capacity. Major coal fields in India are Raniganj, Jharia, Bokaro, Singrauli, and Godavari valley. The coal states of India are Jharkhand, Orissa, West Bengal, Madhya Pradesh, Andhra Pradesh and Maharashtra. Anthracite coal occurs only in J & K.

When coal is burnt it produces carbon dioxide, which is a greenhouse gas responsible for causing enhanced global warming. Coal also contains impurities like sulphur and therefore as it burns the smoke contains toxic gases like oxides of sulphur and nitrogen.

Petroleum: It is the lifeline of global economy. There are 13 countries in the world having 67% of the petroleum reserves which together form the OPEC (Organization of Petroleum Exporting Countries). About 1/4th of the oil reserves are in Saudi Arabia.

At the present rate of usage, the world's crude oil reserves are estimated to get exhausted in just 40 years. Some optimists, however, believe that there are some yet undiscovered reserves. Even then the crude oil

reserves will last for another 40 years or so. Crude petroleum is a complex mixture of alkane hydrocarbons. Hence it has to be purified and refined by the process of fractional distillation, during which process different constituents separate out at different temperatures. We get a large variety of products from this, namely, petroleum gas, kerosene, petrol, diesel, fuel oil, lubricating oil, paraffin wax, asphalt, plastic etc.

Petroleum is a cleaner fuel as compared to coal as it burns completely and leaves no residue. It is also easier to transport and use. That is the reason why petroleum is preferred amongst all the fossil fuels.

Liquefied Petroleum Gas (LPG): The main component of petroleum is butane, the other being propane and ethane. The petroleum gas is easily converted to liquid form under pressure as LPG. It is odorless, but the LPG in our domestic gas cylinders gives a foul smell. This is, in fact, due to ethyl mercaptan, a foul smelling gas, added to LPG so that any leakage of LPG from the cylinder can be detected instantaneously.

Oil fields in India are located at Digboi (Assam), Gujarat Plains and Bombay High, offshore areas in deltaic coasts of Godavari, Krishna, Kaveri and Mahanadi.

Natural Gas: It is mainly composed of methane (95%) with small amounts of propane and ethane. It is a fossil fuel. Natural gas deposits mostly accompany oil deposits because it has been formed by decomposing remains of dead animals and plants buried under the earth. Natural gas is the cleanest fossil fuel. It can be easily transported through pipelines. It has a high calorific value of about 50KJ/G and burns without any smoke.

Currently, the amount of natural gas deposits in the world are of the order of 80, 450 g m⁻³. Russia has maximum reserves (40%), followed by Iran (14%) and USA (7%). Natural gas reserves are found in association with all the oil fields in India. Some new gas fields have been found in Tripura, Jaisalmer, off-shore area of Mumbai and the Krishna-Godavari Delta. Natural gas is used as a domestic and industrial fuel. It is used as a fuel in thermal power plants for generating electricity. It is used as a source of hydrogen gas in fertilizer industry and as a source of carbon in tyre industry.

Compressed Natural Gas (CNG): It is being used as an alternative to petrol and diesel for transport of vehicles. Delhi has totally switched over to CNG where buses and auto rickshaws run on this new fuel. CNG use has greatly reduced vehicular pollution in the city.

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Unit 3: Biodiversity and Biotic Resources

2 BIODIVERSITY The word biodiversity is a combination of two words: “biological and diversity” and refers to the variety of life on the Earth. Biodiversity is the degree of variation of life forms within a given species, ecosystem, biome, or an entire planet. Biodiversity is a measure of the health of ecosystems. The term biological diversity was used first by wildlife scientist and conservationist Raymond F. Dasmann in the 1968. The term's contracted form biodiversity may have been coined by W.G. Rosen in 1985 Biodiversity is usually considered at three different levels: The following are different types of biodiversity 40

1. Genetic diversity: variety in the genetic makeup among individuals within a species
2. Species diversity: variety among the species or distinct types of living organisms found in different habitats of the planet
3. Ecosystem or ecological diversity: variety of forests, deserts, grasslands, streams, lakes, oceans, coral reefs, wetlands and other biological communities
4. Functional diversity: biological and chemical processes of functions such as energy flow an matter cycling needed for the survival of species and biological communities

1. Genetic Diversity: Genetic diversity is the “raw material” that permits species to adjust to a changing world whether these changes are due to natural factors or are caused by human factors. It refers to the variation at the level of individual genes and provides a mechanism for populations to adapt to their ever-changing environment. Eg: Human beings

2. Species Diversity: Species diversity refers to the different types of living organisms on Earth. This includes the many types of birds, insects, plants, bacteria, fungi, mammals, and more. Many differing species often live together in communities depending on each other to provide their needs. A species can be defined as a group or population of similar organisms that reproduce by interbreeding within the group. Members of a species do not normally reproduce with members of any other species. Members of a specific species possess common characteristics that distinguish them from other species and this remains constant regardless of geographic location.

3. Ecosystem Diversity: Ecological diversity or ecosystem diversity is the variety of biological communities, such as forests, deserts, grasslands and streams that interact with one another and with their physical and chemical (nonliving) environments. It relates to the different forms of life which are present in any one particular area or site, in more precise terms, it concerns the different species of a particular genus which are present in an ecological community.

2.2.1 VALUES OF BIODIVERSITY

The value of biodiversity (in terms of its commercial utility, ecological services, social and aesthetic values) is enormous. There are several ways that biodiversity and its various forms are Valuable to humans. The biodiversity value may be classified as follows:

1. CONSUMPTIVE VALUE: Biodiversity is an essential requirement for the maintenance of global food supply. The main sources of human food include animals, fish and plant produces. A large number of plants are consumed by human beings as food. A few animal species are consumed by people which come from cattle, pigs, sheep, goats, buffaloes, chickens, ducks, geese and turkey species. Fish: Many fresh water fish can be grown in ponds. Israel and China already get about half of their fish from aqua culture. Drugs &

medicines: About 75% of the world's population depends upon plants or plant extracts for medicines. The drug Penicillin used as an antibiotic is derived from a fungus called Penicillium. Likewise, Tetracycline from bacteria which is used to cure malaria is obtained from the bark of cinchona tree. . Fuel: The fossil fuels like coal, petroleum products and natural gas are the products of biodiversity.

2. PRODUCTIVE VALUE: Some of the organisms are commercially usable where the product is marketed and sold. The animal products like tusks of elephants; musk from deer; silk from silkworm; wool from sheep or goats; fur of many animals etc all of which are traded in the market. Eg: Calabar bean was traditionally used as a poison in West Africa. Daisy plants were first used as a lice remedy in the Middle East and this led to the Discovery of Pyrethrum. Mosquito coils made from Pyrethrum are sold in the market. The bacterium Bacillus thuringiensis produces toxic proteins that kill certain insects.

3. SOCIAL VALUE: These are the values associated with the social life, religion and spiritual aspects of the people. Many of the plants are considered to be sacred in our country like Tulasi, Mango leaves, Banana leaves . The leaves, fruits, flowers of some of the plants are used in worship. Many animals like cow, snake, bull, peacock also have significant place in spiritual and thus hold special importance. Thus, biodiversity has distinct social value, attached with different societies.

4. ETHICAL VALUE: The ethical value means that human beings may or may not use a certain species but knowing the very fact that this species exists in nature gives pleasure. For eg: A peculiar species of Pigeon, grey / white bird with short legs is no more on this earth. Similarly, Dodo species is also no more. Human beings are not deriving anything direct from Kangaroo, giraffe but strongly feel that these species should exist in nature.

5. AESTHETIC VALUE: Every one of us would like to visit vast stretches of lands to enjoy the visible life. People from farther areas, spend a lot of time and money to visit wild life areas where they can enjoy the aesthetic value of biodiversity and this type of tourism is known as eco tourism. Eco-tourism is estimated to generate 12 billion dollars of revenue annually that roughly gives the aesthetic value of biodiversity. A study of the impact of environment on the psyche was undertaken by Kaplan and Kaplan (1989) in which they found that being near nature relieved working stresses while people who worked in closed environment or human made structures experienced much more job stresses and illnesses.

2.2.2 BIODIVERSITY AT GLOBAL, NATIONAL AND LOCAL LEVEL The enormous diversity of life forms in the biosphere has evolved essentially through the process of trial and error during course of organic evolution. The changes in character of living organism which confer some advantage to the species are retained. The changes in climatic conditions are reflected in the distribution of living organism and the pattern of biodiversity on our planet. The number of species present per unit area decreases as we move from mild tropics to the tundra's. The Indian region (8° to 30° N and 60° to 97.5°) with total area of 329 million hectares is very rich in biodiversity. It is estimated that about 4500 species of plants occur in this country. The position of Indian sub-continent at the confluence of there biogeography reels is also an important contributing factor and explain the preserve of African, European, Sind, Japanese and Indo-Malayan elements in the flora and fauna in India. It is the sum total of such remarkable 42 diversity that has made India a "gene bank" for a number of food crops, forest trees, medical and aromatic plants and domesticated animal. Forests are important bioreserves; most of the 1700 million hectares

of tropical forests are located in poor countries. The forests surrounding Reo de Aneroid are part of vegetation which is rich in species of plants and animals that are endemic. There are about 53.5% of trees species found only in these forests and studies of birds, reptiles, primates and butter flies have revealed equally high or higher endemics. 2.2.3 INDIA AS A MEGA DIVERSITY NATION India contains a great wealth of biodiversity in the forests, wet lands and marine areas. Hence biodiversity can be observed at all levels ie locally, nationally and globally . India, as a subcontinent representing a major part of South Asia is rich in flora and fauna and hence it is one of the world's "MEGADIVERSITY NATIONS" . It is estimated that over 75000 species of animals and over 45000 species of plants are found in India. Biogeographic regions of India: According to wild life Institute of India, the country has 10 distinct biogeographic zones or regions. They are: 1. Trans – Himalayan Zone 2. Himalayan Zone 3. Desert Zone 4. Semi – arid Zone 5. Western Ghats 6. Deccan Zone 7. Gangetic plain Zone 8. NE Indian Zone 9. Coastal Zone 10. Islands around the country

2.2.4 HOT SPOTS OF BIODIVERSITY Areas which exhibit high species richness as well as high species endemism are termed as hot spots of biodiversity. Species which are restricted only to particular areas are known as endemic. India shows a good number of endemic species. About 62% of amphibians and 50% of lizards are endemic to India. Western Ghats are the site of maximum endemism. The term "Hot spots" was introduced by Myers (1988). There are 25 such hot spots of biodiversity on a global level out of which two are present in India, namely the Eastern Himalayas and Western Ghats. These hotspots covering less than 2% of the world's land area are found to have about 50% of the terrestrial biodiversity. According to Myers an area is designated as a hotspot when it contains at least 0.5% of the plant species as endemics. a) Eastern Himalayas: They display an ultra-varies topography that fosters species diversity and endemism. Recent studies have shown that North East India along with its contiguous regions of Burma and Chinese provinces of Yunnan and Schezwan is an active center of organic evolution and is considered to be the cradle of flowering plants. Out of the world's recorded flora 30% are endemic to India of which 35000 are in the Himalayas. 43 b) Western Ghats: It extends along a 17000 km² strip of forests in Maharashtra, Karnataka, Tamilnadu and Kerala and has 40% of the total endemic plant species. The major centers of diversity are Agastyamalai Hills and Silent valley- the new Amambalam Reserve Basin .It is reported that only 6.8% of the original forests are existing today while the rest has been deforested or degraded, which raises a serious cause of alarm, because it means we have already lost a huge proportion of the biodiversity.

2.2.5 THREATS TO BIODIVERSITY Extinction or elimination of a species is a natural process of evolution. In the geologic period the earth has experienced mass extinctions. During evolution, species have died out and have been replaced by others. However, the rate of loss of species in geologic past has been a slow process, keeping in view the vast span of time going back to 444 million years. The process of extinction has become particularly fast in the recent years of civilization. Edward O. Wilson prefers the acronym HIPPO, standing for habitat destruction, invasive species, pollution, human overpopulation, and over-harvesting Following are the major causes and issues related to threats to biodiversity: 1. Habitat destruction: Habitat destruction has played a key role in extinctions, especially related to tropical forest destruction. Factors contributing to habitat loss are: overpopulation, deforestation, pollution (air pollution, water pollution, soil

contamination) and global warming or climate change. Habitat size and numbers of species are systematically related. Physically larger species and those living at lower latitudes or in forests or oceans are more sensitive to reduction in habitat area. Conversion to "trivial" standardized ecosystems (e.g., monoculture following deforestation) effectively destroys habitat for the more diverse species that preceded the conversion. In some countries lack of property rights or lax law/regulatory enforcement necessarily leads to biodiversity loss (degradation costs having to be supported by the community) 2. Poaching: Illegal trade of wildlife products by killing prohibited endangered animals i.e. poaching is another threat to wildlife. Despite international ban on trade in products from endangered species, smuggling of wildlife items like furs, hides, horns, tusks, live specimens and herbal products worth millions of dollars per year continues, the developing nations in Asia, Latin America and Africa are the richest source of biodiversity and have enormous wealth of wildlife. The rich countries in Europe and North America and some affluent countries in Asia like Japan, Taiwan and Hong Kong are the major importers of the wildlife products or wildlife itself. The trading of such wild life products is highly profit making for the poachers who just hunt these prohibited wild lives and smuggle it to other countries mediated through mafia. The worst part is that for every live animal that actually gets into the market about 50 additional animals are caught and killed If you are fond of rare plants, fish or birds, please make sure that you are not going to the endangered species or wild-caught species. Doing so will help in checking further decline of these species. Also do not purchase fur coat, purse or bag, or items made of crocodile skin or python skin. You will certainly help in preserving biodiversity by doing so. 44 3. Man-Wildlife Conflicts: We have discussed about the need to preserve and protect wildlife. However, sometimes we come across conflicting situations when wildlife starts causing immense damage and danger to man and under such conditions it becomes very difficult for the forest department to pacify the affected villages and gain local support for wildlife conservation. Instances of man animal conflicts keep on coming to lime light from several states in our country. In Sambalpur, Orissa 195 humans were killed in the last 5 years by elephants. In retaliation the villagers killed 95 elephants in the border region of Kote-Chamarajanagar belt in Mysore have been reported recently. The man-elephant conflict in this region has arisen because of massive damage done by the elephants to the farmer's cotton and sugarcane crops. The agonized villagers electrocute the elephants and sometimes hide explosives in the sugarcane fields, which explode as the elephants intrude into their fields. In fact, more killings are done by locals than by poachers. Causes of Man-animal conflicts: Dwindling habitats of tigers, elephants, rhinos and bears due to shrinking forests cover are compelled to move outside the forests and attack the field or sometimes even humans. Human encroachment into the forest areas has rendered all forest living animals to trespass the borders of human civilizations. This is because the conflicts between man and the wildlife have increased since it is an issue of survival of both

3.1 Invasive Non-Native Species: Species that are non-native to a particular area can sometimes spread very quickly, for example the zebra mussel and Japanese knotweed have spread rapidly in Ireland in the past two decades. As a result, these species can destabilize an ecosystem by altering habitats affecting food webs.

3.2 Pollution/Litter: As you will remember from the Litter and Waste theme, pollution is always caused by humans. Pollution can have a huge impact, altering the balance within ecosystems, and is the cause of death for millions of animals and plants around the world every year. 3.3 Land Use Change/Increased Infrastructure Development: This is the

alteration of natural areas by humans, for example, the clearing of huge areas of rainforest in South America for farming. In Ireland, upland open habitats, such as rough grassland, scrub and heath, have been changed by agriculture and afforestation. 3.4 Intensive Farming Practices: Extensive use and concentrations of chemical and/or biological pesticides and the removal of hedgerows are typical practices in modern-day intensive farming. Often large areas of land are planted with a single crop (monocultures) which greatly reduces the level of biodiversity in that area. 3.5 Climate Change: It is now widely accepted that the current global rate of change in climate is as a result of human activity. As global air or sea temperature changes, even by just 1 or 2 degrees, the habitats in which species live will also change and may even become uninhabitable to some species.

2.2.6 ENDANGERED AND ENDEMIC SPECIES

Endangered species A species whose numbers are reduced to the point. That means endangered species are in immediate danger of extinction. The International Union Conservation of Nature (IUCN) classified the species of plants and animals as: (a) Endangered species (b) Threatened species: Species (including animals, plants, fungi, etc.) which are vulnerable to endangerment in the near future) (c) Rare species : Among the important endangered animal species, Indian wild ass; the Kashmir stag, the Golden Langur etc .. are considered highly endangered. There are also endangered bird species like Siberian crane; the great Indian Bustard; the florican etc.. The IUCN published the data on endangered species of both plants and animals of India. The data symbolizes the working signal for those species which are endangered and if not protected are likely to become extinct in near future A species is said to be extinct when it is not seen in the wild for 50 years at a stretch e.g. Dodo, Passenger Pigeon. A species is said to be endangered when its number has been reduced to a critical level or whose habitat, have been drastically reduced and if such species is not protected and conserved, it is in immediate danger of extinction.

Endangered species of India The International Union for Conservation of Nature and Natural Resources(IUCN) publishes the Red Data Book which include the list of endangered species of plants and animals. The red data symbolizes the warning signal for those species which are endangered and if not protected are likely to become extinct in near future The animals that are listed under the critically endangered category are as under: 1)MalabarLargeSpottedCivet 2)NamdaphaFlyingSquirrel 3)SalimAli'sFruitBat 4)SumatranRhinoceros EndangeredSpeciesareasunder: 1)AsiaticLion 2)AsiaticBlackBear 3)DesertCat 4)GreatIndianRhinoceros 5)IndianElephant(or)AsianElephant ThreatenedSpeciesareasunder: 1)IndianWildAss 2)Leopard 46 Endemic species of India India has two biodiversity hot-spots and thus possesses a large number of endemic species. The endemic species are those taxa whose distribution is confined to a restricted area due to their specific ecological niches and edaphic gradients. Therefore, the habitats of endemic species are far more vulnerable than other species. Endemic species once lost, it is a loss of biodiversity of these species forever. In India there are about 5725 endemic taxa of angiosperms (33.5% of Indian flora) which are located in 25 hot spots. The major hotspots in India which contain largest number of endemic plant species are the Southern Western Ghats and Eastern Himalayas with 1286 and 1808 endemic species respectively. There are about 1272 species of endemic angiosperms out of 3800 species occurring in Kerala (33.5% of Kerala flora) which represent 22.6% of Indian endemics. Seventy percent of the 1272 species of endemics have the major areas of distribution in Kerala with spill over in

adjacent regions. On the basis of the study of the distributional range, about 102 endemic species occur exclusively in Kerala. A large number out of a total of 81,000 of animals in our country is endemic. The Western Ghats are particularly rich in amphibians (frogs, toads etc) and reptiles (lizards, crocodiles etc) about 62% amphibians and 50% lizards are endemic to Western Ghats

.2.2.7 CONSERVATION OF BIODIVERSITY In order to maintain and conserve biodiversity, the Ministry of Environment and Forests, government of India has already taken several steps to manage wildlife, the objectives of which are: 1. Maintenance of a number of species in protected areas such as National Parks, Sanctuaries.. 2. To improve the biosphere reserves 3. Implement strict restrictions of export of rare plants and animals 4. Educate the public on these through the government agencies and NGO's. 47 A) In-situ conservation: The preservation of species in its natural ecosystem is called in-situ conservation. As a consequence, protected areas are being identified and maintained for natural conservation of species by individual countries. For the conservation and management of endangered species several projects have been established. These are: Tiger Projects: Corbett National Park which is 300 km from New Delhi is the oldest National Park of India having 1318.54 sq km. It was one of the nine Tiger Reserves created at the launch of the Project Tiger in 1973. Gir Lion Projects: The Gir Forest of Gujarat where lions are found. This has an area of 1412 sq kms and declared as a National Park. Elephant Projects: The objective was to ensure long-term survival of population of elephants (not come into operations). Project Elephant (PE), a centrally sponsored scheme, was launched in February 1992 to provide financial and technical support to major elephant bearing States in the country for protection of elephants and their habitats. The Project is being implemented in 13 States/UTs, viz..Andhra Pradesh, Arunachal Pradesh, Assam, Jharkhand, Karnataka, Kerala, Meghalaya, Nagaland, Orissa, Tamil Nadu, Uttaranchal, Uttar Pradesh and West Bengal. There are about 7000 protected areas in the world which include a variety of National parks, Sanctuaries etc which vary in size (between 100 to 500 sq km), purpose (protection of one or more species and their habitats).. In India, there are 39 National Parks and 492 wildlife sanctuaries. National Parks: These are protected areas exclusively for wild life. Human activities like hunting, Firewood collection, timber harvesting etc... are restricted in these areas to that wild plants and animals could grow in a protected environment The following measures should be adopted for the conservation of biodiversity: 1. Over grazing in the forest and areas of vegetation should be controlled because it may Destroy the useful rare plants. 2. The habitat of plants and animals should be conserved. 3. The natural condition of ecosystem should be studied and researched in time and again, then Specific programs for conservation should be conducted. 4. Human activities should be done without destroying natural environment. 5. Illegal hunting and smuggling of animals and plants should be strictly avoided. 6. Effective laws and rules should be adopted for the conservation of rare animals and plants. 7. Industries are established from the raw materials. During the process of collecting raw materials, care should be taken not to destroy useful plants and habitats of animals. 8. Public awareness should be created about the importance of rare animals and plants, causes of rareness and measures for their preservation. B) Ex-situ conservation: The conservation of elements of biodiversity out of the context of their natural habitats is referred to as ex-situ conservation. Zoos, botanical gardens and seed banks are all example of ex-situ conservation. In India we have the following important gene and seed bank facilities. 48 i) National Bureau of Plant Genetic Resources (NBPGR) is located in New

Delhi. Here agricultural and horticultural crops are stored by cryopreservation of seeds, pollens etc. by using liquid nitrogen at a low temperature as low as -196°C . ii) National Bureau of Animal Genetic Resources (NBAGR) located at Karnal, Haryana. It preserves the semen of domesticated bovine animals.

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Unit 4: Environmental Pollution and Control Technologies

For normal and healthy living a conducive environment is required by all the living beings, including humans, livestock, plants, microorganisms and the wildlife.

The favourable unpolluted environment has a specific composition. When this composition gets changed by addition of harmful substances, the environment is called polluted environment and the substances polluting it are called pollutants.

Environmental pollution can, therefore, be defined as any undesirable change in the physical, chemical or biological characteristics of any component of the environment (air, water, soil), which can cause harmful effects on various forms of life or property.

Environmental pollution could be of various types

AIR POLLUTION

Air pollution can, therefore, be defined as any undesirable change in the physical, chemical or biological characteristics of air, which can cause harmful effects on various forms of life or property.

It is an atmospheric condition in which certain substances (including the normal constituents in excess) are present in concentrations which can cause undesirable effects on man and his environment. These substances include gases, particulate matter, radioactive substances etc.

- Gaseous pollutants include oxides of sulphur (mostly SO₂, SO₃) oxides of nitrogen (mostly NO and NO₂ or NO_x), carbon monoxide (CO), volatile organic compounds (mostly hydrocarbons) etc.
- Particulate pollutants include smoke, dust, soot, fumes, aerosols, liquid droplets, pollen grains etc.
- Radioactive pollutants include radon-222, iodine-131, strontium-90, plutonium-239 etc.

Sources of Air Pollution

The sources of air pollution are natural and man-made (anthropogenic).

Natural Sources: The natural sources of air pollution are volcanic eruptions, forest fires, sea salt sprays, biological decay, photochemical oxidation of terpenes, marshes, extra terrestrial bodies, pollen grains of flowers, spores etc. Radioactive minerals present in the earth crust are the sources of radioactivity in the atmosphere

Man-made sources: Man made sources include thermal power plants, industrial units, vehicular emissions, fossil fuel burning, agricultural activities etc. Thermal power plants have become the major sources for generating electricity in India as the nuclear power plants couldn't be installed as planned. The main pollutants emitted are fly ash and SO₂. Metallurgical plants also consume coal and produce similar pollutants. Fertilizer plants, smelters, textile mills, tanneries, refineries, chemical industries, paper and pulp mills are other sources of air pollution.

Automobile exhaust is another major source of air pollution. Automobiles release gases such as carbon monoxide (about 77%), oxides of nitrogen (about 8%) and hydrocarbons (about 14%). Heavy duty diesel vehicles spew more NO_x and suspended particulate matter (SPM) than petrol vehicles which produce more carbon monoxide and hydrocarbons.

Classification: On the basis of origin of pollutants

a) Primary pollutants : These are emitted directly from the point sources . Ex: Smoke, dust...etc.

b) Secondary pollutants : These are formed by interaction of primary pollutants with other primary pollutants (or) primary pollutants with natural constituents of atmosphere. Ex: Smog, PAN

Effects of air pollution: Air pollution has adverse effects on living organisms and materials

Effects on Human Health:

- Human respiratory system has a number of mechanisms for protection from air pollution. Bigger particles ($> 10 \mu\text{m}$) can be trapped by the hairs and sticky mucus in the lining of the nose. Smaller particles can reach tracheobronchial system and there get trapped in mucus.
- They are sent back to throat by beating of hair like cilia from where they can be removed by spitting or swallowing. Years of exposure to air pollutants (including cigarette smoke) adversely affect these natural defences and can result in lung cancer, asthma, chronic bronchitis and emphysema (damage to air sacs leading to loss of lung elasticity and acute shortness of breath).
- Suspended particulates can cause damage to lung tissues and diseases like asthma, bronchitis and cancer especially when they bring with them cancer causing or toxic pollutants attached on their surface.
- Sulphur dioxide (SO_2) causes constriction of respiratory passage and can cause bronchitis like conditions.
- In the presence of suspended particulates, SO_2 can form acid sulphate particles, which can go deep into the lungs and affect them severely.
 - Oxides of nitrogen especially NO_2 can irritate the lungs and cause conditions like chronic bronchitis and emphysema.
 - Carbon monoxide (CO) reaches lungs and combines with haemoglobin of blood to form carboxyhaemoglobin. CO has affinity for haemoglobin 210 times more than oxygen. Haemoglobin is, therefore, unable to transport oxygen to various parts of the body. This causes suffocation. Long exposure to CO may cause dizziness, unconsciousness and even death.
 - Many other air pollutants like benzene (from unleaded petrol), formaldehyde and particulates like polychlorinated biphenyls (PCBs) toxic metals and dioxins (from burning of polythene) can cause mutations, reproductive problems or even cancer.
 - Hazardous materials like Asbestos, Mercury, Arsenic and radioactive materials cause lung diseases and effect to other organs like brain, kidney, liver, heart....etc

Effects on Plants:

- Air pollutants affect plants by entering through stomata (leaf pores through which gases diffuse), destroy chlorophyll and affect photosynthesis.
- Pollutants also erode waxy coating of the leaves called cuticle.
- Cuticle prevents excessive water loss and damage from diseases, pests, drought and frost.
- Damage to leaf structure causes necrosis (dead areas of leaf), chlorosis (loss or reduction of chlorophyll causing yellowing of leaf) or epinasty (downward curling of leaf), and abscission (dropping of leaves). Particulates deposited on leaves can form encrustations and plug the stomata. The damage can result in death of the plant.

Effects on aquatic life:

- Air pollutants mixing up with rain can cause high acidity (lower pH) in fresh water lakes.
- This affects aquatic life especially fish. Some of the freshwater lakes have experienced total fish death.

Control of Air pollution

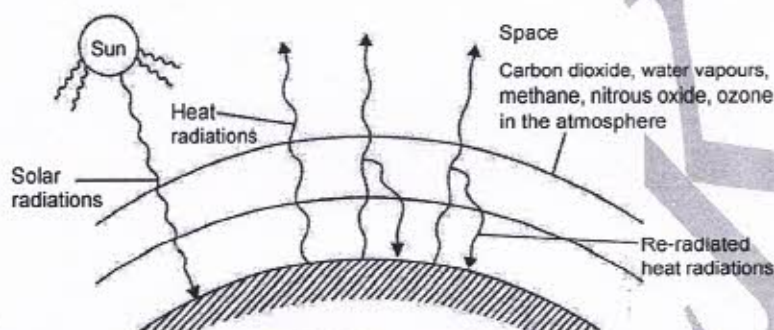
Air pollution can be minimized by the following methods:

- Use non-conventional sources.
- Shifting to less polluting fuels.
- Planting more trees.
- Use transport system like bicycle...etc.
- Using low sulphur coal in industries.

- Minimize activities which cause pollution like transportation and energy production.
- Reduction of pollution at sources.

Global Warming

- Troposphere, the lowermost layer of the atmosphere, traps heat by a natural process due to the presence of certain gases. This effect is called Green House Effect as it is similar to the warming effect observed in the horticultural greenhouse made of glass.
- The amount of heat trapped in the atmosphere depends mostly on the concentrations of “heat trapping” or “greenhouse” gases and the length of time they stay in the atmosphere. The major greenhouse gases are carbon dioxide, ozone, methane, nitrous oxide, chlorofluorocarbons (CFCs) and water vapours.
- Heat trapped by greenhouse gases in the atmosphere keeps the planet warm is called global warming.



Greenhouse Effect

The enhanced greenhouse effect will not only cause global warming but will also affect various other climatic and natural processes.

(i) **Global temperature increase:** It is estimated that the earth's mean temperature will rise between 1.5 to 5.5°C by 2050 if input of greenhouse gases continues to rise at the present rate. Even at the lower value, earth would be warmer than it has been for 10,000 years.

(ii) **Rise in Sea Level:** With the increase in global temperature sea water will expand. Heating will melt the polar ice sheets and glaciers resulting in further rise in sea level. Current models indicate that an increase in the average atmospheric temperature of 3°C would raise the average global sea level by 0.2–1.5 meters over the next 50–100 years.

One meter rise in sea level will inundate low lying areas of cities like Shanghai, Cairo, Bangkok, Sydney, Hamburg and Venice as well as agricultural lowlands and deltas in Egypt, Bangladesh, India, China and will affect rice productivity. This will also disturb many commercially important spawning grounds, and would probably increase the frequency of storm damage to lagoons, estuaries and coral reefs.

In India, the Lakshadweep Islands with a maximum height of 4 meters above the level may be vulnerable. Some of the most beautiful cities like Mumbai may be saved by heavy investment on embankment to prevent inundation.

Life of millions of people will be affected, by the sea level rise who have built homes in the deltas of the Ganges, the Nile, the Mekong, the Yangtze and the Mississippi rivers.

(iii) **Effects on Human Health:** The global warming will lead to changes in the rainfall pattern in many areas, thereby affecting the distribution of vector-borne diseases like malaria, filariasis, elephantiasis etc.

Areas which are presently free from diseases like malaria, schistosomiasis etc. may become the breeding grounds for the vectors of such diseases. The areas likely to be affected in this manner are Ethiopia, Kenya and Indonesia. Warmer temperature and more water stagnation would favour the breeding of mosquitoes, snails and some insects, which are the vectors of such diseases.

Higher temperature and humidity will increase/aggravate respiratory and skin diseases.

(iv) **Effects on Agriculture:** There are different views regarding the effect of global warming on agriculture. It may show positive or negative effects on various types of crops in different regions of the world. Tropical and subtropical regions will be more affected since the average temperature in these regions is already on the higher side. Even a rise of 2°C may be quite harmful to crops. Soil moisture will decrease and evapotranspiration will increase, which may drastically affect wheat and maize production.

Increase in temperature and humidity will increase pest growth like the growth of vectors for various diseases. Pests will adapt to such changes better than the crops.

To cope up with the changing situation drought resistant, heat resistant and pest resistant varieties of crops have to be developed.

Ozone Layer Depletion

For the last 450 million years the earth has had a natural sunscreen in the stratosphere called the ozone layer. This layer filters out harmful ultraviolet radiations from the sunlight and thus protects various life forms on the earth.

Ozone is a form of oxygen. The molecule of oxygen contains two atoms whereas that of ozone contains three (O₃). In the stratosphere ozone is continuously being created by the absorption of short wave-length ultraviolet (UV) radiations. Ultraviolet radiations less than 242 nanometres decompose molecular oxygen into atomic oxygen (O) by photolytic decomposition.

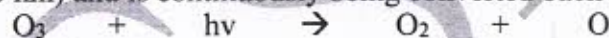


The atomic oxygen rapidly reacts with molecular oxygen to form ozone.



(M is a third body necessary to carry away the energy released in the reaction).

Ozone thus formed distributes itself in the stratosphere and absorbs harmful ultraviolet radiations (200 to 320 nm) and is continuously being converted back to molecular oxygen.



Absorption of UV radiations results in heating of the stratosphere.

The net result of the above reactions is an equilibrium concentration of ozone. Ozone concentration in about 24 km of the stratosphere i.e. from 16 km to 40 Km away from earth is about 10 ppm (as compared to 0.05 ppm concentration of harmful tropospheric ozone). This equilibrium is disturbed by reactive atoms of chlorine, bromine etc. which destroy ozone molecules and result is thinning of ozone layer generally called ozone hole

The amount of atmospheric ozone is measured by 'Dobson Spectrometer' and is expressed in Dobson units (DU). One DU is equivalent to a 0.01 mm thickness of pure ozone at the density it would possess if it were brought to ground level (1atm) pressure. Normally over temperate latitude its concentration is about 350 DU, over tropics it is 250 DU whereas at subpolar regions (except when ozone thinning occurs) it is on an average 450 DU. It is because of the stratospheric winds which transport ozone from tropical towards polar regions

Effects of Ozone Depletion

- Ozone depletion in the stratosphere will result in more UV radiation reaching the earth especially UV-B (290-320 nm). The UV-B radiations affect DNA and the photosynthetic chemicals. Any change in DNA can result in mutation and cancer. Cases of skin cancer (basal and squamous cell carcinoma) which do not cause death but cause disfigurement will increase.
- Easy absorption of UV rays by the lens and cornea of eye will result in increase in incidents of cataract.
- Melanin producing cells of the epidermis (important for human immune system) will be destroyed by UV-rays resulting in immuno-suppression. Fair people (can't produce enough melanin) will be at a greater risk of UV exposure.

- Phytoplanktons are sensitive to UV exposure. Ozone depletion will result in decrease in their population thereby affecting the population of zooplankton, fish, marine animals, in fact the whole aquatic food chain.
- Yield of vital crops like corn, rice, soybean, cotton, bean, pea, sorghum and wheat will decrease.
- Degradation of paints, plastics and other polymer material will result in economic loss due to effects of UV radiation resulting from ozone depletion

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SOLID WASTE MANAGEMENT

Solid waste (waste other than liquid or gaseous) can be classified as municipal, industrial, agricultural, medical, mining waste and sewage sludge.

Sources of Urban and Industrial Wastes

Urban waste consists of medical waste from hospitals; municipal solid wastes from homes, offices, markets (commercial waste) small cottage units, and horticulture waste from parks, gardens, orchards etc.

- Waste from homes (Domestic waste) contains a variety of discarded materials like polyethylene bags, empty metal and aluminium cans, scrap metals, glass bottles, waste paper, diapers, cloth/rags, food waste etc.
- Waste from shops mainly consists of waste paper, packaging material, cans, bottles, polyethylene bags, peanut shells, eggshells, tea leaves etc.
- Biomedical waste includes anatomical wastes, pathological wastes, infectious wastes etc.
- Construction/demolition waste includes debris and rubbles, wood, concrete etc.
- Horticulture waste and waste from slaughter houses include vegetable parts, residues and remains of slaughtered animals, respectively.
- Industrial waste: Industrial waste consists of a large number of materials including factory rubbish, packaging material, organic wastes, acids, alkalis and metals etc. During some industrial processing large quantities of hazardous and toxic materials are also produced. The main sources of industrial wastes are chemical industries, metal and mineral processing industries. Radioactive wastes are generated by nuclear power plants. Thermal power plants produce fly ash in large quantities. Solid wastes from other types of industries include scrap metal, rubber, plastic, paper, glass, wood, oils, paints, asphalt, tars, dyes, scrap leather, ceramics, abrasives, slag, heavy metals, asbestos, batteries.

The urban solid waste materials that can be degraded by micro-organisms are called biodegradable wastes. Examples of this type of waste are vegetable wastes, stale food, tea leaves, egg shells, peanut shells, dry leaves etc. Wastes that cannot be degraded by micro-organisms are called non-biodegradable wastes. For example, polyethylene bags, scrap metal, glass bottles etc.

Effects of Solid Wastes

Municipal solid wastes heap up on the roads due to improper disposal system. People clean their own houses and litter their immediate surroundings which affects the community including themselves. This type of dumping allows biodegradable materials to decompose under uncontrolled and unhygienic conditions. This produces foul smell and breeds various types of insects and infectious organisms besides spoiling the aesthetics of the site.

Industrial solid wastes are sources of toxic metals and hazardous wastes, which may spread on land and can cause changes in physico-chemical and biological characteristics thereby affecting productivity of soils. Toxic substances may leach or percolate to contaminate the ground water.

In refuse mixing the hazardous wastes are mixed with garbage and other combustible waste. This makes segregation and disposal all the more difficult and risky. Various types of wastes like cans, pesticides, cleaning solvents, batteries (zinc, lead or mercury) radioactive materials, plastics are mixed up with paper, scraps and other non-toxic materials which could be recycled. Burning of some of these materials produce dioxins, furans and polychlorinated biphenyls, which have the potential to cause various types of ailments including cancer.

Management of Solid Waste: For waste management we stress on 'three R's'-Reduce, reuse and recycle before destruction and safe storage of wastes.

(i) Reduction in use of raw materials: Reduction in the use of raw materials will correspondingly decrease the production of waste. Reduced demand for any metallic product will decrease the mining of their metal and cause less production of waste.

(ii) Reuse of waste materials: The refillable containers which are discarded after use can be reused. Villagers make casseroles and silos from waste paper and other waste materials. Making rubber rings from the discarded cycle tubes which are used by the newspaper vendors, instead of rubber bands, reduces the waste generation during manufacturing of rubber bands. Because of financial constraints poor people reuse their materials to the maximum.

(iii) Recycling of materials: Recycling is the reprocessing of discarded materials into new useful products.

(i) Formation of some old type products e.g. old aluminium cans and glass bottles are melted and recast into new cans and bottles.

(ii) Formation of new products: Preparation of cellulose insulation from paper, preparation of fuel pellets from kitchen waste. Preparation of automobiles and construction materials from steel cans.

The process of reducing, reusing and recycling saves money, energy, raw materials, land space and also reduces pollution. Recycling of paper will reduce cutting of trees for making fresh paper. Reuse of metals will reduce mining and melting of ores for recovery of metals from ores and prevent pollution

Discarding of Solid Wastes

For discarding wastes the following methods can be adopted:

(i) Sanitary landfill: In a sanitary landfill, garbage is spread out in thin layers, compacted and covered with clay or plastic foam.

In the modern landfills the bottom is covered with an impermeable liner, usually several layers of clay, thick plastic and sand. The liner protects the ground water from being contaminated due to percolation of leachate. Leachate from bottom is pumped and sent for treatment. When landfill is full it is covered with clay, sand, gravel and top soil to prevent seepage of water. Several wells are drilled near the landfill site to monitor if any leakage is

contaminating ground water. Methane produced by anaerobic decomposition is collected and burnt to produce electricity or heat.

(ii) Composting: Due to shortage of space for landfill in bigger cities, the biodegradable yard waste (kept separate from the municipal waste) is allowed to degrade or decompose in an oxygen rich medium. A good quality nutrient rich and environmental friendly manure is formed which improves the soil conditions and fertility.

(iii) Incineration: Incinerators are burning plants capable of burning a large amount of materials at high temperature. The initial cost is very high. During incineration high levels of dioxins, furans, lead and cadmium may be emitted with the fly ash of incinerator. Dioxin level may reach many times more than in the ambient environment. For incineration of materials, it is better to remove batteries containing heavy metals and plastic containing chlorine before burning the material. Prior removal of plastics will reduce emissions of dioxins and polychlorinated biphenyls (PCBs).

e-WASTE MANAGEMENT

"Electronic waste" or "E-Waste" may be defined as discarded computers, office electronic equipment, entertainment device electronics, mobile phones, television sets, and refrigerators. This includes used electronics which are destined for reuse, resale, salvage, recycling, or disposal.

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Unit 5: Environmental Policy , Legislation & EIA

SUSTAINABLE DEVELOPMENT

Sustainable development is defined as “meeting the needs of the present without compromising the ability of future generations to meet their own needs.”

Sustainable development implies using the natural resources in such a manner which doesn't eliminate or diminish their usefulness for future generations eg: coal, crude oil; forests. Hence, the concept of Sustainable Development could be termed development without destruction.

Measures for Sustainable Development: Following are the measures for the sustainable development:

1. Population Control: Population growth should be limited to the desirable level. Slow human population growth, reduce the stress on global life.
2. Biodiversity (variety of life on earth and how the living things interact with each other) must be conserved.
3. Recycling of wastes: Recycle at least 60% of the materials which are discarded now as trash.
4. Reduced Consumption: Lifestyle should be shifted to lesser consumption of resources.
5. Efficient usage of Resources: Resources should be renewed or reused. For eg: solar energy should be encouraged.
6. Water Resource Management: Some of the consequences of poor water resource management such as
 - (A) River flooding;
 - (B) Silting of reservoirs, ponds, lakes;
 - (C) over exploitation of groundwater;
 - (D) Water logging by over irrigation
 - (E) Improper drainage
 - (F) Pollution of water bodies

are to be taken up for implementation. So, Sustainable development insists optimum management of water resources locally and globally.

7. Integrated Land use planning: Using lands for agriculture, forestry, fodder cultivation, industrial growth, traffic etc should be planned.
8. Creating Awareness: Creation of environmental awareness and spreading environmental education among the people is must for fruitful results..

Threats To Sustainability: Though the measures are adopted for implementation of Sustainable Development , some of the threats such as Energy depletion; climate system collapse; ecological collapse; Economic slump etc are reduce the sustainability of life.

- Energy depletion: The availability of crude oil resources are less and usage is more and more. Since the increased number of human beings mainly dependent on energy source especially fossil fuels, the future generation will have to work hard to restructure the way they live.
- Climate system collapse: Huge quantities of Green House Gases have been releasing into the atmosphere over the last 100 years. And more is being released every day, future generation may be unstable with the climate systems of floods, storms, droughts, extreme temperatures etc

- Ecological collapse: Numerous industries are coming up by consuming the natural resources and releasing the toxic substances into the atmosphere. These substances cause soil pollution, air pollution; water pollution and in turn causing the imbalance of ecosystem.
- Economic slump: Although the world has never had an economic recession all over, there may be a global economic depression may takes place because of the destruction of ecosystem.

ENVIRONMENTAL EDUCATION

- Education plays a very important role in dealing with the global issue.
- Environmental Education is an integral process, which deals with man's interrelationship with his (natural and man made) surroundings viz., relation of population, pollution, resource allocation, resource depletion, conservation, technology; urban and rural planning.
- Environmental Education is intended to promote the awareness and understanding of the environment among the citizens. Hence, Environmental Education is meant to bring about the required changes in knowledge, understanding attitudes and skills pertaining to the environment, conservation and ecological balance.
- So, Environmental Education must be considered as a solution for all environmental problems and the goal of Environmental Education should be to improve and enhance the quality of life.

The objectives of Environmental Education are:

- Awareness--- to help individuals acquire an awareness of environment and its allied problems.
- Knowledge--- to acquire basic understanding of the environment
- Skills--- to acquire the skills for solving environmental problems. Participation-to develop responsibility regarding environmental problems to ensure appropriate action to solve those problems.

Importance of Environmental Education:

The importance of environmental protection has long been recognized in our country. Article 51 (g) of the constitution states “ It shall be the duty of every citizen to protect and improve the Natural environment including forests, lakes, rivers, wild life” etc..

Education about environment provides learners with the know how on environment. Education for environment will be concerned about conservation, preservation and upgradation.

Conservation of Natural Resources: As the human population increases, greater demands are placed upon the available natural resources. Large areas of the earth are being converted for the exclusive use of man. Thus, many valuable natural resources, which were available yesterday are not seen today.

At present, world environment is suffering critical stress not only by utilization of natural resources but also with the environmental damage inflicted by deforestation, species loss and climate change. So, a new environmental ethic with responsibility is required to recognize the earth's limited capacity of natural resources. This ethic must motivate the people to effect the needed changes.

The global population had already crossed 6 billions and may reach 8 billions by 2019 while the per capita availability of forests, pasture lands, crop lands etc will be decreased. Resources consumption in developed countries causes significant pollution problems, environmental degradation and resource depletion. For eg: an average US citizen consumes 50 times as much as the average citizen of India.

Hence, there must be a holistic way of thinking regarding the management of land resources, water resources, forest resources etc..

Over-exploitation of resources: The over-use or over-harvesting of plants, animals or natural resources threatens the Earth's biodiversity is called as overexploitation.

Over-exploitation causes diminishing of resources which include medicinal plants, forest wood, grazing pastures, fish stocks, forests; water aquifers and species extinctions. If over-exploitation is sustained, it can lead to the destruction of the environment.

Over-hunting has been a significant cause of the extinction of hundreds of species including whales large mammals etc. Commercial hunting, both legal and illegal is the principal threat.

Deforestation, Desertification, Extinction of species; Soil erosion; Fossil fuel depletion;

Ozone depletion; increase of Green House Gases etc may arise from over-exploitation of natural resources.

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(Approved by AICTE New Delhi & Affiliated to JNTU Hyderabad)

INTELLECTUAL PROPERTY RIGHTS (IPR)

NOTES

Prepared By

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&

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***MC509: INTELLECTUAL PROPERTY RIGHTS**

B.Tech. III Year I Sem.

L T P D C
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UNIT – I

Introduction to Intellectual property: Introduction, types of intellectual property, international organizations, agencies and treaties, importance of intellectual property rights.

UNIT – II

Trade Marks: Purpose and function of trademarks, acquisition of trade mark rights, protectable matter, selecting, and evaluating trade mark, trade mark registration processes.

UNIT – III

Law of copy rights: Fundamental of copy right law, originality of material, rights of reproduction, rights to perform the work publicly, copy right ownership issues, copy right registration, notice of copy right, international copy right law.

Law of patents: Foundation of patent law, patent searching process, ownership rights and transfer

UNIT – IV

Trade Secrets: Trade secrete law, determination of trade secrete status, liability for misappropriations of trade secrets, protection for submission, trade secrete litigation.

Unfair competition: Misappropriation right of publicity, false advertising.

UNIT – V

New development of intellectual property: new developments in trade mark law; copy right law, patent law, intellectual property audits.

International overview on intellectual property, international – trade mark law, copy right law, international patent law, and international development in trade secrets law.

TEXT & REFERENCE BOOKS:

1. Intellectual property right, Deborah. E. Bouchoux, Cengage learning.
2. Intellectual property right – Unleashing the knowledge economy, prabuddha ganguli, Tata McGraw Hill Publishing company ltd

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Objectives:

Intellectual property rights (IPR) have increasingly assumed a vital role and become important in the face of dynamically changing trade environment characterized by global competition, high innovation risks, short product cycle, rapid changes in technology, high investments in research and development (R&D) etc. that we are witnessing today. Rapid changes in the global economic environment with the influence of high speed internet connectivity created new development of business models and opportunities, where IPR is a critical aspect for potential growth.

Regardless of the type and volume of product or service an enterprise makes or provides, they need to have proper knowledge of IPR laws for protecting, managing and enforcing their intellectual property rights, so as to get the best possible commercial value from its ownership. In India several new legislations for protection of IPRs have been passed in accordance with International treaties such as TRIPS, WIPO etc.

As majority of the IPs are being produced in the field of Science and Engineering Technology, it is felt by the Board of Governance of MRCET to introduce the concepts of IPR to the students at the much early stage of their Engineering study thereby they can focus on protection of their innovative ideas and thoughts in accordance with the statues of the state.


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UNIT-1

INTELLECTUAL PROPERTY RIGHTS

Introduction

Intellectual property (IP) is a term referring to creation of the intellect (the term used in studies of the human mind) for which a monopoly (from greek word monos means single polein to sell) is assigned to designated owners by law. Some common types of intellectual property rights (IPR), in some foreign countries intellectual property rights is referred to as *industrial property*, copyright, patent and trademarks, trade secrets all these cover music, literature and other artistic works, discoveries and inventions and words, phrases, symbols and designs. Intellectual Property Rights are themselves a form of property called intangible property.

Although many of the legal principles governing IP and IPR have evolved over centuries, it was not until the 19th century that the term *intellectual property* began to be used and not until the late 20th century that it became commonplace in the majority of the world.

Types of Intellectual Property

The term intellectual property is usually thought of as comprising four separate legal fields:

1. Trademarks
2. Copyrights
3. Patents
4. Trade secrets

1. Trademarks and Service Marks: A trademark or service mark is a word, name, symbol, or device used to indicate the source, quality and ownership of a product or service. A trademark is used in the marketing is recognizable sign, design or expression which identifies products or service of a particular source from those of others. The trademark owner can be an individual, business organization, or any legal entity. A trademark may be located on a package, a label, a voucher or on the product itself. For the sake of corporate identity trademarks are also being.

General Logos:



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The Trademark Registration Logo



In addition to words, trademarks can also consist of slogans, design, or sounds. Trademark provides guarantee of quality and consistency of the product or service they identify. Companies expend a great deal of time, effort and money/ in establishing consumer recognition of and confidence in their marks.



Federal Registration of trademarks:

Interstate use of trademarks is governed by federal law, namely, the United States Trademark Act (also called the Lanham Act), found at 15 U.S.C 1051et seq. In the United States, trademarks are generally protected from their date of first public use. Registration of a mark is not required to secure protection for a mark, although it offers numerous advantages, such as allowing the registrant to bring an action in federal court for infringement of the mark.

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Applications for federal registration of trademarks are made with the PTO. Registration is a fairly lengthy process, generally taking anywhere from twelve to twenty-four months or even longer. The filing fee is \$335 per mark (Present \$225 per class) per class of goods or services covered by the mark.

A trademark registration is valid for 10 years and may be renewed for additional ten year periods thereafter as long as the mark is in used in interstate commerce. To maintain a mark the registrant is required to file an affidavit with the PTO between the fifth and sixth year after registration and every ten years to verify the mark is in continued use. Marks not in use are then available to others.

A properly selected, registered and protected mark can be of great value to a company or individual desiring to establish and expand market share and better way to maintain a strong position in the marketplace.

2 Copyrights: Copyright is a form of protection provided by U.S. law (17 U.S.C 101 et seq) to the authors of "original works of authorship" fixed in any tangible medium of expression. The manner and medium of fixation are virtually unlimited. Creative expression may be captured in words, numbers, notes, sounds, pictures, or any other graphic or symbolic media. The subject matter of copyright is extremely broad, including literary, dramatic, musical, artistic, audiovisual, and architectural works. Copyright protection is available to both published and unpublished works.

Copyright protection is available for more than merely serious works of fiction or art. Marketing materials, advertising copy and cartoons are also protectable. Copyright is available for original working protectable by copyright, such as titles, names, short phrases, or lists of ingredients. Similarly, ideas methods and processes are not protectable by copyright, although the expression of those ideas is.

Copyright protection exists automatically from the time a work is created in fixed form. The owner of a copyright has the right to reproduce the work, prepare derivative works based on the original work (such as a sequel to the original), distribute copies of the work, and to perform and display the work. Violations of such rights are protectable by infringement actions. Nevertheless, some uses of copyrighted works are considered "fair use" and do not constitute infringement, such as use of an insignificant portion of a work for noncommercial purposes or parody of a copyrighted work.

Definition:

General Definition of copyright "Copyright owner", with respect to any one of the exclusive rights comprised in a copyright, refers to the owner of that particular right.

Federal Registration of Copyrights: The works are protected under federal copyright law from the time of their creation in a fixed form. Registration, however, is inexpensive, requiring only a \$30 (present

\$85) filing fee, and the process is expeditious. In most cases, the Copyright Office processes applications within four to five months.

Copyrighted works are automatically protected from the moment of their creation for a term generally enduring for the author's life plus an additional seventy years after the author's death. The policy underlying the long period of copyright protection is that it may take several year for a painting, book, or opera to achieve its true value, and thus, authors should receive a length of protection that will enable the work to appreciate to its greatest extent.

3 Patents: A patent for an invention is the grant of a property right to the inventor, issued by the United States Patent and Trademark Office. Generally, the term of a new patent is 20 years from the date on which the application for the patent was filed in the United States or, in special cases, from the date an earlier related application was filed, subject to the payment of maintenance fees. U.S. patent grants are effective only within the United States, U.S. territories, and U.S. possessions. Under certain circumstances, patent term extensions or adjustments may be available.

The right conferred by the patent grant is, in the language of the statute and of the grant itself, "the right to exclude others from making, using, offering for sale, or selling" the invention in the United States or "importing" the invention into the United States. What is granted is not the right to make, use, offer for sale, sell or import, but the right to exclude others from making, using, offering for sale, selling or importing the invention. Once a patent is issued, the patentee must enforce the patent without aid of the USPTO.

There are three types of patents:

Utility patents may be granted to anyone who invents or discovers any new and useful process, machine, article of manufacture, or composition of matter, or any new and useful improvement thereof;

Design patents may be granted to anyone who invents a new, original, and ornamental design for an article of manufacture; and

Plant patents may be granted to anyone who invents or discovers and asexually reproduces any distinct and new variety of plant.

Federal Registration of Copyrights: Patents are governed exclusively by federal law (35 U.S.C 100 et seq). To obtain a patent, an inventor must file an application with the PTO (the same agency that issues trademark registration) that fully describes the invention. Patent prosecution is expensive, time consuming and complex. Costs can run into the thousands of dollars, and it generally takes over two year for the PTO to issue a patent.

Patent protection exists for twenty years from the date of filing of an application for utility and patents and fourteen years from the date of grant for design patents. After this period of time, the invention fall into the public domain and may be used by any person without permission.

The inventor is granted an exclusive but limited period of time within which to exploit the invention. After the patent expires, any member of the public is free to use, manufacture, or sell the invention. Thus, patent law strikes a balance between the need to protect inventors and the need to allow public access to important discoveries.

4 Trade Secrets: A trade secret consists of any valuable business information. The business secrets are not to be known by the competitor. There is no limit to the type of information that can be protected as trade secrets; **For Example:** *Recipes, Marketing plans, financial projections, and methods of conducting business can all constitute trade secrets.* There is no requirement that a trade secret be unique or complex; thus, even something as simple and nontechnical as a list of customers can qualify as a trade secret as long as it affords its owner a competitive advantage and is not common knowledge.

If trade secrets were not protectable, companies would no incentive to invest time, money and effort in research and development that ultimately benefits the public. Trade secret law thus promotes the development of new methods and processes for doing business in the marketplace.

Protection of Trade Secrets: Although trademarks, copyrights and patents are all subject to extensive statutory scheme for their protection, application and registration, there is no federal law relating

to trade secrets and no formalities are required to obtain rights to trade secrets. Trade secrets are protectable under various state statutes and cases and by contractual agreements between parties. **For Example:** *Employers often require employees to sign confidentiality agreements in which employees agree not to disclose proprietary information owned by the employer.*

If properly protected, trade secrets may last forever. On the other hand, if companies fail to take reasonable measures to maintain the secrecy of the information, trade secret protection may be lost. Thus, disclosure of the information should be limited to those with a "need to know" it so as to perform their duties, confidential information should be kept in secure or restricted areas, and employees with access to proprietary information should sign nondisclosure agreements. If such measures are taken, a trade secret can be protected in perpetuity.

Another method by which companies protect valuable information is by requiring employee to sign agreements promising not to compete with the employer after leaving the job. Such covenants are strictly scrutinized by courts, but generally, if they are reasonable in regard to time, scope and subject matter, they are enforceable.

AGENCIES RESPONSIBLE FOR INTELLECTUAL PROPERTY REGISTRATION

United States Patents and Trademark Office:

The agency charged with granting patents and registering trademarks is the United States Patent and Trademark Office (PTO), one of fourteen bureaus within the U.S. Department of Commerce. The PTO, founded more than two hundred years ago, employs nearly 700 (present

1000 employes) are working. At present it is located in 18 building in Arlington, Virginia. Its official mailing address is Commissioner of Patents and Trademarks, Washington, DC 20231.

The PTO is physically located at 2900 Crystal Drive in Arlington, Virginia. Its web site is <http://www.uspto.gov> and offers a wealth of information, including basic information about trademarks and patents, fee schedules, forms, and the ability to search for trademarks and patents. Since 1991, under the Omnibus Budget Reconciliation Act, the PTO has operated in much the same way as a private business, providing valued products and services to customers in exchange for fees that are used to fully fund PTO operations.

It uses no taxpayer funds. The PTO plans to move all of its operations to Alexandria, Virginia, by mid-2005. The PTO is one of the busiest of all government agencies, and as individuals and companies begin to understand the value of intellectual property, greater demands are being made on the PTO.

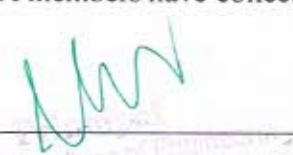
Legislation passed in 1997 established the PTO as a performance-based organization that is managed by professionals, resulting in the creation of a new political position, deputy secretary of commerce for intellectual property. In brief, the PTO operates more like a business with greater autonomy over its budget, hiring, and procurement. U.S patents issued its first patent in 1790. Since 1976 the text and images of more than three million are pending for registration. The PTO is continuing its transition filing for both trademarks and from paper to electronic filing for both trademarks and patents.

The PTO is led by the Under Secretary of Commerce for Intellectual Property and Director of the United States Patent and Trademark Office (the "Director"), who is appointed by the President. The Secretary of Commerce appoints a Commissioner for Patents and a Commissioner for Trademarks. Citations to many cases in this text will be to "U.S.P.Q.", a reference to United States Patent Quarterly, a reporter of cases decided by the Trademark Trial and Appeal Board (TTAB) as well as patent and copyright cases.

INTERNATIONAL ORGANIZATIONS, AGENCIES AND TREATIES

There are a number of International organizations and agencies that promote the use and protection of intellectual property. Although these organizations are discussed in more detail in the chapters to follow, a brief introduction may be helpful:

International Trademark Association (INTA) is a not-for-profit international association composed chiefly of trademark owners and practitioners. It is a global association. Trademark owners and professionals dedicated in supporting trademarks and related IP in order to protect consumers and to promote fair and effective commerce. More than 4000 (*Present 6500 member*) companies and law firms more than 150 (*Present 190 countries*) countries belong to INTA, together with others interested in promoting trademarks. INTA offers a wide variety of educational seminars and publications, including many worthwhile materials available at no cost on the Internet (see INTA's home page at <http://www.inta.org>). INTA members have collectively



contributes almost US \$ 12 trillion to global GDP annually. INTA undertakes advocacy [active support] work throughout the world to advance trademarks and offers educational programs and informational and legal resources of global interest. Its head quarter in New York City, INTA also has offices in Brussels, Shanghai and Washington DC and representative in Geneva and Mumbai. This association was founded in 1878 by 17 merchants and manufacturers who saw a need for an organization. The INTA is formed to protect and promote the rights of trademark owners, to secure useful legislation (the process of making laws), and to give aid and encouragement to all efforts for the advancement and observance of trademark rights.

World Intellectual Property Organization (WIPO) was founded in 1883 and is specialized agency of the United Nations whose purposes are to promote intellectual property throughout the world and to administer 23 treaties (Present 26 treaties) dealing with intellectual property. WIPO is one of the 17 specialized agencies of the United Nations. It was created in 1967, to encourage creative activity, to promote the protection of Intellectual Property throughout the world. More than 175 (*Present 188*) nations are members of WIPO. Its headquarters in Geneva, Switzerland, current Director General of WIPO is *Francis Gurry* took charge on October 1, 2008. The predecessor to WIPO was the BIRPI [Bureaux for the Protection of Intellectual Property] it was established in 1893. WIPO was formally created by the convention (meeting) establishing the world intellectual Property organization which entered into force on April 26 1970.

Berne Convention for the Protection of Literary and Artistic Works (the Berne Convention)
An International copyright treaty called the convention for the protection of Literary and Artistic works signed at Berne, Switzerland in 1886 under the leadership of *Victor Hugo* to protect literary and artistic works. It has more than 145 member nations. The United States became a party to the Berne Convention in 1989. The Berne Convention is administered by WIPO and is based on the precept that each member nation must treat nation must treat nationals of other member countries like its own nationals for purposes of copyright (the principle of “nation treatment”). In addition to establishing a system of equal treatment that internationalized copyright amongst signatories, the agreement also required member states to provide strong minimum standards for copyrights law. It was influenced by the French “right of the author”.

Madrid Protocol It is a legal basis is the multilateral treaties Madrid (it is a city situated in Spain) Agreement concerning the International Registration of Marks of 1891, as well as the protocol relating to the Madrid Agreement 1989. The Madrid system provides a centrally administered system of obtaining a bundle of trademark registration in separate jurisdiction. The protocol is a filing treaties and not substantive harmonization treaty. It provides a cost-effective and efficient way for trademark holder. It came into existence in 1996. It allows trademark protection for more than sixty countries, including all 25 countries of the European Union.

Paris Convention The Paris convention for the protection of Industrial Property, signed in Paris, France, on 20th March 1883, was one of the first Intellectual Property treaties, after a diplomatic conference in Paris, France, on 20 March 1883 by Eleven (11) countries. According to Articles 2 and 3 of this treaty, juristic (one who has through knowledge and experience of law) and natural persons who are either national of or domiciled in a state party to the convention. The convention

is currently still force. The substantive provisions of the convention fall into *three main categories*: National Treatment, Priority right and Common Rules.

An applicant for a trademark has six months after filing an application in any of the more than 160 member nations to file a corresponding application in any of the other member countries of the Paris Convention and obtain the benefits of the first filing date. Similar priority is afforded for utility patent applications, although the priority period is one year rather than six months. The Paris Convention is administered by WIPO.

North American Free Trade Agreement (NAFTA) came into effect on January 1, 1994, and is adhered to by the United States, Canada, and Mexico. The NAFTA resulted in some changes to U.S. trademark law, primarily with regard to marks that include geographical terms. The NAFTA was built on the success of the Canada-U.S Free Trade Agreement and provided a compliment to Canada's efforts through the WTO agreements by making deeper commitments in some key areas. This agreement has brought economic growth and rising standards of living for people in all three countries.

General Agreement on Tariffs and Trade (GATT) was concluded in 1994 and is adhered to by most of the major industrialized nations in the world. The most significant changes to U.S intellectual property law from GATT are that nonuse of a trademark for three years creates a presumption the mark has been abandoned and that the duration of utility patent is now twenty years from the filing date of the application (rather than seventeen years from the date the patent issued, as was

THE INCREASING IMPORTANCE OF INTELLECTUAL PROPERTY RIGHTS

- ❖ Protecting Intellectual Property Rights
- ❖ Technology has led to increase awareness about the IP
- ❖ Some individuals and companies offer only knowledge. Thus, computer consultant, advertising agencies, Internet companies, and software implementers sell only brainpower.
- ❖ Domain names and moving images are also be protected
- ❖ More than fifty percent of U.S. exports now depend on some form of intellectual property protection.
- ❖ The rapidity with which information can be communicated through the Internet has led to increasing challenges in the field of intellectual property.
- ❖ The most valuable assets a company owns are its Intellectual property assets
- ❖ Companies must act aggressively to protect these valuable assets from infringement (breaching, violation of law) or misuse by others
- ❖ The field of intellectual property law aims to protect the value of such investments

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UNIT-2

TRADE MARKS

Introduction

Although there was some use of trademarks or symbols in the Middle East and Far East several centuries ago, contemporary (modern) trademark law can be traced back to use of trademarks during the medieval period in Europe by merchants who sought to distinguish the goods they sold from those sold by others by applying a mark or symbol to their goods. By viewing the mark, purchasers would immediately be able to identify the craftspeople that made the goods and make an informed decision about the quality of the material. The use of symbols by medieval craftspeople to distinguish and identify their goods is the direct antecedent for the modern use of trademarks.

Definition of Trademark:

The modern definition of trademark is that *"it is a word, name, symbol, or device or a combination thereof, used by a person [including a business entity], or which a person has a bonafide intention to use, to identify and distinguish his or her goods from those manufactured by others and to indicate the source of those goods."*

PURPOSE AND FUNCTION OF TRADEMARK

Trademarks perform two critical functions in the marketplace: [1] *they provide assurance that goods are of a certain quality and consistency, and [2] they assist consumers in making decisions about the purchase of goods.* The main purpose of trademark is to show the difference about the quality of goods and service **For example:** If a trademark such as NIKE could be counterfeited (imitating) and used by another on inferior merchandise (goods), there would be no incentive for the owners of the NIKE mark to produce high-quality shoes and to expend money establishing consumer recognition of the products offered under the NIKE marks.

Thus, protection of trademarks results in increased competition in the marketplace, with both the producer of goods and services and the consumer as the ultimate beneficiaries. Business benefit because they can reap the rewards of their investment in developing and marketing a product with one fearing another business will deceive consumer by using the same or a confusingly similar mark for like goods, and consumers benefit because they are able to identify and purchase desired and quality goods.

The value inherent in achieving consumer loyalty to a particular product or service through the maintenance of consistent quality of the products or service offered under a mark is called goodwill.

- ❖ they identify one maker's goods or services and distinguish them from those offered by others
- ❖ They indicate that all goods or services offered under the mark come from a single producer, manufacturer, or "source"
- ❖ They indicate that all goods or services offered under the mark are of consistent quality and
- ❖ They serve as an advertising device so that consumers link a product or service being offered with a mark

TYPES OF MARKS

There are four different types of marks. They are:

1. Trademark
2. Service mark
3. Certification mark
4. Collective mark

Trademark & Service mark

The term trademark thus refers to some physical and tangible good, and service mark refers to an intangible service, in common usage the term *trademark* is often used to refer to marks for both goods and service. The key point in this legal description is that a trademark is a visual mark that may use any combination of letters and imagery to aid a company in differentiating itself from other entities.

The purpose of a trademark is to visually represent a person, company, or product, and trademark should be designed to provide easy and definite recognition. The term **mark** will be used as a synonym for both trademark and service marks. The federal statute ((law) an act passed by a legislative body) governing trademark law, the U.S. Trademark Act (Lanham Act, found at 15 U.S.C 1051 et seq.) itself states that the term mark includes any trademark, service mark, collective mark, or certificate mark.

A Certification mark

A certification mark is a word, name, symbol, device, or combination thereof, used by one person to certify that the goods or services of others have certain features in regard to quality, material, mode of manufacture, or some other characteristic (or that the work done on the goods or services was performed by members of a union or other organization). **For example:** Hallmark, ISO mark and in U.S Underwriters Laboratory seals of approval (*Underwriters Laboratory is the largest and best known independent, not for profit testing laboratory in the world based in Northwood, Illinois, UL conducts safety and quality tests on a broad range of products, from firedoor's to CCTV cameras seals of approval*).

Collective Mark

A collective mark is one used by a collective membership organization, such as a labor union, fraternity, or professional society, to identify that the person displaying the mark is a member of the organization. Thus, the FUTURE FARMERS OF AMERICA and AMERICAN BAR ASSOCIATION marks indicate membership in certain organizations. A company may use several marks **For Example:** the word: COCA-COLA, the stylized WAVE DESIGN, and the slogan "THINGS GO BETTER WITH COKE". All of these marks are used on one product and all are protected by the Coca-Cola Company. On some occasions, companies use house marks to establish recognition in a wide range of products or service.

ACQUISITION OF TRADEMARK RIGHTS

In most foreign countries, trademark rights arise from registering the mark with a governmental entity. The law in the United States is quite different: trademark rights arise from adoption and *use* of a mark. A person using a mark may have valid and enforceable rights in a mark even though the mark is not registered with the PTO, such an owner will have priority even over a subsequent user who has secured a federal registration for a mark with the PTO. The "use" required to establish trade mark rights is more than token use, it must be public use, while actual sales of products or services are not required, a certain level of presale activity is required. **For example:** *Sales within a company or to personal friends are insufficient to show use, while soliciting [plead for something] and accepting order is usually sufficient to show commercial use.* Thus, a person using a mark may have valid and enforceable rights in a mark even though the mark is not registered with the PTO. Such an owner will have priority even over a subsequent user who has secured a federal registration for a mark with the PTO.

Establishing a date of first use is critical for a trademark owner because priority of trademark rights is measured from this date. If one party first used of mark on September 15, 2015 and another first used a similar mark on October 15, 2015, the prior, or **senior, user** will be able to preclude the **junior user** from using a confusingly similar mark.

For a mark to be registrable, it must be based on use in commerce, meaning the type of commerce that can be regulated by Congress. Generally, the use is based on interstate commerce or commerce between states (although it could be based on commerce between the United State and a foreign country). A purely intrastate use does not provide a basis for federal registration of a mark. A purely intrastate use does not provide a basis for federal registration of a mark. The requirement of interstate (within one state) commerce is satisfied if the goods or services are advertised in more than one state, offered to citizens of more than one state, or offered on the Internet, which is considered use in commerce because it is available to a national audience through the use of telephone lines.


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The general rule is that acquisition of trademark rights stem from use, there is one exception to this rule: the **intent-to-use application**. Until 1989, the United States was one of only two countries in the world that required that a mark be in actual use before an owner could file an application to register it. After an applicant had begun using the mark and then filed an application, the PTO might refuse registration of the mark on the basis it was confusingly similar to a prior mark or was subject to some other defect. The applicant would then have invested substantial money and time in developing the mark, in using it in commerce, marketing and advertising, and in applying for registration, only to be told the mark was unregistrable. **To remedy this situation**, the Trademark Law Revision Act of 1988 allowed persons to file applications for marks based on a bona fide intent to use the mark in commerce in the future. If the PTO determines the mark is unregistrable, the applicant will not have expended any sums other than the PTO filing fee and can readily file another application for a new mark. Once the mark proceeds to registration, priority is measured from the date the intent-to-use-application was filed, even though that filing date may precede actual use in commerce by more than three years.

Minimal or token use cannot serve as the basis for securing or maintaining a registration, ensuring that an owner does not reserve or “warehouse” a mark by making only sporadic use of it with the intent to

block others from using it rather than having a true commercial intent to exploit the mark for sales. The PTO desires to clear its records of unused marks, or “deadwood”, so that such unused marks may be available by others. The use required is “bonafide use of a mark in the ordinary course of trade, and not made merely to reserve a right in a mark”, 15 U.S.C 1127.


COMMON LAW RIGHTS, FEDERAL REGISTRATION UNDER THE LANHAM ACT, LAWS AND TREATIES GOVERNING TRADEMARKS, AND STATE TRADEMARK RIGHTS

Common Law Rights

The United States, trademark rights arise from use of a mark. It is not necessary to secure permission or registration from any governmental entity to acquire trademark rights. A party who is using a mark without any such governmental registration is said to have a **common law trademark**, it can be enforced in any geographical area in which the mark is used.

Federal Registration

Although there is no requirement that a trademark owner apply for a secure federal registration of mark with the PTO, registration on the PTO’s Principal Register does offer several advantages:


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- ❖ nationwide constructive use effective from the filing date of the application (the public assumed to have notice that the registrant has nationwide priority in the use of its mark as of this date)
- ❖ nationwide notice to the public of an owner's claim to a mark, thereby precluding a later user from claiming it used a mark in good faith in a remote territory and should be able to continue use;
- ❖ the ability to bar importance of goods bearing infringing trademarks
- ❖ the right under the Paris Convention to obtain a registration in various foreign countries based upon the U.S. registration;
- ❖ the right to bring an action in federal court for trademark infringement and recover lost profits, damages, costs, and possibly triple damages and attorney's fees
- ❖ incontestable status of the registration after five years of continuous use subsequent to the registration
- ❖ the right to use the registration symbol with the mark
- ❖ a possible basis to claim priority to an Internet domain name and
- ❖ prima facie (literally, "on its face") evidence of the validity of the registration, the registrant's ownership of the mark, and the registrant's exclusive right to use the mark in connection with the identified goods and services.

Laws and Treaties Governing Trademark

There are several laws and treaties governing trademark, including the following:

Lanham Act The federal statute governing trademark rights is the **Lanham Act** (also called the United States Trademark Act and found at 15 U.S.C § 1051 et seq.), enacted in 1946 and named for Congressman Fritz Garland Lanham (D.Tex.), the then chair of the House Patent Committee (which also proposed legislation relating to trademarks) who introduced the legislation. In addition to providing for federal trademark protection, the Lanham Act also includes statutes prohibiting unfair competition. The Lanham Act has been amended numerous times. Perhaps the most significant amendment occurred with the Trademark Law Revision Act of 1988, which provided the following two critical changes: allowing for a trademark application based on the applicant's intent to use a mark in the future. Rules of practice and procedure relating to trademarks are found at Title 37 of the Code of Federal Regulation (C.F.R).

North American Free Trade Agreement (NAFTA) came into effect on January 1, 1994, and is adhered to by the United States, Canada, and Mexico. The NAFTA resulted in some changes to U.S. trademark law, primarily with regard to marks that include geographical terms. The NAFTA was built on the success of the Canada-U.S Free Trade Agreement and provided a compliment to Canada's efforts through the WTO agreements by making deeper commitments in some key areas. This agreement has brought economic growth and rising standards of living for people in all three countries.

Madrid Protocol It is a legal basis is the multilateral treaties Madrid (it is a city situated in Spain) Agreement concerning the International Registration of Marks of 1891, as well as the protocol relating to the Madrid Agreement 1989. The Madrid system provides a centrally administered system of obtaining a bundle of trademark registration in separate jurisdiction. The protocol is a filing treaties and not substantive harmonization treaty. It provides a cost-effective and efficient way for trademark holder. It came into existence in 1996. It allows trademark protection for more than sixty countries, including all 25 countries of the European Union.

Trade-Related aspects of Intellectual Property Rights (TRIPS) is an international agreement administered by the World Trade Organization (WTO) that sets down minimum standards for many forms of intellectual property (IP) regulation as applied to nationals of other WTO Members. It was negotiated at the end of the Uruguay Round of the General Agreement on Tariffs and Trade (GATT) in 1994.

The Doha declaration is a WTO statement that clarifies the scope of TRIPS, stating for example that TRIPS can and should be interpreted in light of the goal "to promote access to medicines for all." Specifically, TRIPS requires WTO members to provide copyright rights, covering content producers including performers, producers of sound recordings and broadcasting organizations; geographical indications, including appellations of origin; industrial designs; integrated circuit layout-designs; patents; new plant varieties; trademarks; trade dress; and undisclosed or confidential information. TRIPS also specifies enforcement procedures, remedies, and dispute resolution procedures.

Trademark Law Treaty Implementation Act (TLTIA) effective in late 1998 simplified several requirements relating to trademark registration and maintenance. **For example:** at present, the applicant need only submit one specimen showing how a mark is used rather than three, as was previously required. Additionally, a trademark applicant need no longer state the manner in which the mark is used. Finally, TLTIA established a six month grace period for filing a renewal for a trademark registration.

Federal Trademark Dilution Act The **Federal Trademark Dilution Act of 1995** is a United States federal law which protects famous trademarks from uses that dilute their distinctiveness, even in the absence of any likelihood of confusion or competition. It went into effect on January 16, 1996. This act has been largely supplanted by the Trademark Dilution Revision Act of 2006 (TDRA), signed into law on October 6, 2006.

Anti cyber squatting Consumer Protection Act. 15 U.S.C. § 1125(d), is an American law enacted in 1999 that established a cause of action for registering, trafficking in, or using a domain name confusingly similar to, or dilutive of, a trademark or personal name. The law was designed to thwart "cyber squatters" who register Internet domain names containing trademarks with no intention of creating a legitimate web site, but instead plan to sell the domain

name to the trademark owner or a third party. Critics of the ACPA complain about the non-global scope of the Act and its potential to restrict free speech, while others dispute these complaints. Before the ACPA was enacted, trademark owners relied heavily on the Federal Trademark Dilution Act (FTDA) to sue domain name registrants. The FTDA was enacted in 1995 in part with the intent to curb domain name abuses. The legislative history of the FTDA specifically mentions that trademark dilution in domain names was a matter of Congressional concern motivating the Act. Senator Leahy stated that "it is my hope that this anti-dilution statute can help stem the use of deceptive Internet addresses taken by those who are choosing marks that are associated with the products and reputations of others".

CATEGORIES OF MARKS

Although marks can consist of words, symbols, designs, slogans, or a combination thereof, not every term is protectable. Even among marks that are protectable, some marks are stronger than other. In determining strength of marks, courts recognize several categories of marks. In ascending order of strength and protectability, the five categories are:

❖ **A Generic Mark** Generic "marks" are devices which actually name a product and are incapable of functioning as a trademark. Unlike descriptive marks, generic devices will not become a trademark even if they are advertised so heavily that secondary meaning can be proven in the mind of consumers. The rationale for creating the category of generic marks is that no manufacturer or service provider should be given exclusive right to use words that generically identify a product. A valid trademark can become generic if the consuming public misuses the mark sufficiently for the mark to become the generic name for the product. The prime examples of former trademarks that became the generic name for a product are ASPIRIN, XEROX and CELLOPHANE.

❖ **A Descriptive mark** (or more properly, "merely descriptive marks") are devices which merely describe the services or goods on which the mark is used. If a device is merely descriptive, it is not a mark at all, since it does not serve to identify the source of the goods or services. No trademark rights are granted to merely descriptive marks. Misdescriptive marks are equally weak. As explained in connection with suggestive marks above, descriptive marks are often difficult to distinguish from suggestive marks. Suggestive marks require some imagination, thought, or perception to reach a conclusion as to the nature of the goods. Descriptive marks allow one to reach that conclusion without such imagination, thought or perception. Putting this distinction into practice can be very difficult. Merely descriptive marks can be registered federally on the Supplemental Register (see the Bit Law discussion on federal registration of trademarks for more information). The descriptive mark will not register in PTO until the consumer links the mark with a single source. That learned association is called **Secondary meaning** or acquired distinctiveness. The PTO assumes that secondary meaning has been acquired after five years of consecutive and exclusive use of a mark. Secondary meaning can be demonstrated by a significant

level of advertising, sales and consumer survey evidence, to prove that when consumer encounter a mark.

For Example: The following imaginary marks could be considered merely descriptive for computer peripherals:

- ✓ FAST BAUD for modems (describing the quickness of the modem);
 - ✓ 104 KEY for computer keyboards (describing the number of keys on a keyboard);
 - ✓ LIGHT for portable computers (describing the computer's weight); and
 - ✓ TUBELESS for computer monitors (even if misdescriptive for a monitor that contains tubes).
- ❖ **A Suggestive mark** are marks that suggest a quality or characteristic of the goods and services. Despite the fact that suggestive marks are not as strong as fanciful or arbitrary marks, suggestive marks are far more common due to the inherent marketing advantage of tying a mark to the product in a customer's mind. Suggestive marks are often difficult to distinguish from descriptive marks (described below), since both are intended to refer to the goods and services in question. Suggestive marks require some imagination, thought, or perception to reach a conclusion as to the nature of the goods. Descriptive marks allow one to reach that conclusion without such imagination, thought or perception. Putting this distinction into practice clearly is one of the most difficult and disputed areas of trademark law.

The following marks can be considered suggestive:

- ✓ MICROSOFT (suggestive of software for microcomputers)
 - ✓ NETSCAPE (suggestive of software which allows traversing the "landscape" of the Internet)
 - ✓ SILICON GRAPHICS (suggestive of graphic oriented computers)
- ❖ **Arbitrary Marks** An arbitrary mark utilizes a device having a common meaning that has no relation to the goods or services being sold.

Examples of arbitrary marks include:

- ✓ APPLE (for computers)
 - ✓ LOTUS (for software)
 - ✓ SUN (for computers)
 - ✓ CROWN (For Television)
- ❖ **Fanciful Marks** are devices which have been invented for the sole purpose of functioning as a trademark and have no other meaning than acting as a mark. Fanciful marks are considered to be the strongest type of mark. Examples of fanciful marks are: EXXON, KODAK and XEROX.

PROTECTABLE MATTER

Slogans, Letters and Numbers

A word or other groupings of letters is the most common type of mark. For Examples: APPLE, SILICON, GRAPHICS, NETSCAPE, IBM, NBC. Slogans from advertising campaigns are also used as trademarks. Example slogans which have strong trademark rights attached For Example:



Nike

Alphanumeric symbols (letters and numbers) may be protectable as long as they are not merely descriptive. If the numbers or letters describe something about the product or service offered under the mark, however, they will not be registrable unless proof of secondary meaning is shown. Thus, the mark "VT220" for computer hardware peripherals was held merely descriptive and unregistrable because "VT" Video Terminal and 220 was a mere model number.

Logos and Symbols

Logos are probably the next most common form of mark. A logo can be described as a design which becomes a mark when used in close association with the goods or services being marketed. The logo mark does not need to be elaborate; it need only distinguish goods and services sold under the mark from other goods and services. Examples of logo marks are:

McDonald's double arches:



NBC's peacock style design:



Apple Computer's Apple:



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Names of performing Artists

A mark that merely serves to identify an artist or entertainer is not registrable. However, if the owner of the mark has controlled the quality of the goods or services, and the name of the artist or group has been used numerous times on different records (thereby representing an assurance of quality to the public), the name may be registered as a trademark. Thus, GOO GOO DOLLS and BOB BYLAN have been registered for musical sound recordings.

Domain Names

Domain names, for example, *www.ibm.com*, are registrable as trademark or service marks only if they function as an identification of the source of goods and service. Thus, *www.oakwood.com* has been registered for real estate leasing service and *www.eilberg.com* was refused registration because the mark merely indicated the location on the Internet where the applicant's web site appeared and it did not separately identify the applicant's legal services. Another complication with domain name registration is that the PTO has held that businesses that create a web site for the sole purpose of advertising their own products or services cannot register a domain name used to identify that activity. Thus, *www.amazon.com* is registered for providing online chat rooms and bulletin boards. It is not registered in connection with offering books or other goods for sale.

Shapes and Containers

A product or container shape can also serve a source identifying function and therefore can be an enforceable trademark. A product or container shape may also be subject to a design patent (see the BitLaw discussion of design patents to see an analysis of the similarities and differences between design patents and trademark protection for product shapes). Historically, trademark protection was not granted to product shapes until the consuming public recognized the shape as indicating the source of the product. In other words, the product shape was required to obtain secondary meaning. However, recent court decisions may mean that an inherently distinctive product shape can be a protectable trademark even before secondary meaning is obtained. Examples of product shapes and configurations that likely enjoy trademark status include:

Coca-cola Bottle



Apple's Ipad




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Trade Dress

Trade dress is the overall commercial image (look and feel) of a product or service that indicates or identifies the source of the product or service and distinguishes it from those of others. It may include the design or configuration of a product; the labeling and packaging of goods; and/or the décor or environment in which services are provided. Trade dress can consist of such elements as size, shape, color and texture to the extent such elements are not functional. In many countries, trade dress is referred to as "get-up" or "product design". Only nonfunctional trade dress can be protected. Because trade dress is often protected through the law of unfair competition.

Color

The color of an item can also function as a trademark. The Supreme Court held in the 1995 case of *Qualitex Co. v. Jacobson Products Co.*, 115 S.Ct. 1300 (1995) that the green-gold color of a dry cleaning press pad can function as a trademark. Before this decision, the argument was often made that color alone could not be considered a trademark, since granting trademark status to colors would soon lead to the depletion of the number of colors available for an object. The Court in *Qualitex* rejected arguments based on this depletion theory, reasoning that alternative colors would usually be available for competitors. In those cases where alternative colors were not available, courts could deny trademark protection in those circumstances where color depletion may actually occur

Fragrances, Sounds, and Moving Images

A sound can also be a trademark or a service mark. The three tone chime of NBC has been registered as a service mark. Sound trademarks recently were in the news when Harley-Davidson announced that it was attempting to register the exhaust sound of a Harley-Davidson motorcycle with the U.S. Patent and Trademark Office (USPTO). Harley-Davidson was reacting to moves by competitors to duplicate the Harley sound in competing motorcycles. Hearings in front of the USPTO have been scheduled to determine whether Harley-Davidson can register the sound. A fragrance can function as trademark if it is distinctive and not functional. **For example:** in *In re Clarke*, 17 U.S.P.Q.2d 1238 (T.T.A.B.1990), a floral fragrance was allowed as a trademark for sewing thread and embroidery yarn and was not functional when used in connection with those goods. The roar of the MGM lion and Woody Woodpecker's distinctive laugh are also registered. Finally, the Internet has given rise to applications for marks that consist of moving images, such as Microsoft company's spinning EXPLORER GLOBE.

Design and Ornamentation

A design can function as a trademark as long as it is distinctive rather than merely functional or ornamental. Some designs are protected on their own, such as Nike's famous "swoosh" design, the alligator that appears on shirts, and Betty Crocker's spoon. If the design is merely background material, however, and does not create a separate commercial impression, or if it consists solely of some simple geometric shape, such as an oval or square, it cannot be protected

without proof of secondary meaning. **For example**, the PTO refused registration of two parallel colored bands placed at the top of socks as pure ornamentation. Merely decorative subject matter and pure ornamentation cannot be registered because they do not identify and distinguish goods or services and thus cannot function as trademark.

Serialized Literary and Movie Titles

The title of a single book or movie title is generally not protectable. The title of a serialized work, such as THE BRADY BUNCH or NEWSWEEK, however, can be protected as a trademark or service mark.

Insignia

Flags, coats of arms, and other insignia of the United States or any state or any foreign nation cannot be registered.

Picture and Drawings

Pictures or drawings of a character or scene are often used as trademarks or service marks.

Corning's Pink Panther



Sun Microcomputer, Inc.'s Duke



MSN's Butterfly



Apples Automator



SELECTING AND EVALUATING A TRADEMARK

Selecting a Mark

The selection of mark occurs in a variety of ways.


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- companies hold contests and encourages employees to create a mark for a new product line or service
- Companies engage sophisticated research
- Branding firms that will conduct surveys and create a mark and a logo or design for the company.
- There are name creation software programs that help individuals and companies create marks

Once the mark is selected, it must be screened and evaluated for use and registrability, if failed then it leads to wastage in expenditure of time and money in advertising, using, and applying for a mark that is rejected for registration by the PTO or, in the worst case scenario, might subject the owner to damages for trademark infringement and unfair competition.

Reviewing a Proposed Mark

Once a mark is selected, it should be carefully scrutinized to ensure that it will not be excluded from protection under the Lanham Act.

- Firstly they have check whether the mark contains scandalous (giving offence to moral sensibilities and injurious to reputation)
- Whether consent from a living person will be required,
- Whether the mark is generic,
- Whether it is statutorily protected
- Whether the mark is descriptive of some feature of the goods and services offered under the mark,
- It also see that the mark includes foreign terms
- Many law firms specializing in trademark work use a questionnaire form or data sheet to gather questionnaire form or data sheet to gather basic information from clients about their marks


THE TRADEMARK SEARCH

Scope of search

- There are a variety of sources that can be reviewed to locate potentially conflicting marks
- There are literally millions of marks registered or applied for at the PTO, and thousands of journals, trade magazines, directories, telephone books, Internet sources, state records, and state trademark registrations that might contain other marks or business names, a computer assisted or online search is the most effective method of searching.
- Both LEXIS and WESTLAW, the computer-assisted legal research system, offer access to vast databases that may point out conflicts.
- One of the best known databases is TRADEMARKSCAN product OF Thomson & Thomson.

Conducting the trademark search

The trademark searching is a two-step process:


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- *a preliminary search* is conducted of the records of the PTO to make a quick determination as to whether the mark may be available or whether there is conflict that would preclude use of the mark. It is also called a **knockout search**.
- If the results of the preliminary or knockout search indicate a mark may be available, a comprehensive search of other sources (including state trademark records, telephone directories, Internet records, and trade journals) is then conducted.

Step One: The Preliminary Search

There are a variety of sources that can be used to conduct an initial trademark search, including online subscription services, CD-ROM, the Patent and Trademark Depository Libraries, and the PTO website search services. Following are some resources commonly used for conducting a preliminary search:

Electronic Database and CD-ROM

- TRADEMARKSCAN is a database owned by Thomson & Thomson, a renowned trademark search firm, which provides information on all active registered trademarks and service marks. The TRADEAMRKSCAN database is primarily used as a quick screening tool to determine the availability of a new mark.
- DIALOG is another database offered by Thomson & Thomson. Its database includes trademarks from the United States plus numerous foreign countries as well as patent and copyright information. It provides online training and practice and free practice searching at the following web site: <http://training.dialog.com/onlinecourses/trademarks/>.
- SAEGIS is an entire suite of services provided by Thomson & Thomson that allows online worldwide trademark searching as well as searching of domain name registries and websites to locate common law uses of proposed marks.
- TRADEMARK.COM is an online search service offered by Micro Patent LLC, offering a variety of searchable databases, including federal marks, and common law uses of potentially conflicting marks.
- LEXIS and WESTLAW, the computer-assisted research system, offer access to vast trademark databases that may disclose potentially conflicting marks.

Many law firms subscribe to one or more of these services so they can perform an initial screening search in-house.

PTO Web Site : Perhaps the easiest and least expensive way to conduct a very preliminary search is to review the records of the PTO (<http://www.uspto.gov>) and its free public searching called *Trademark Electronic Search System (TESS)*.

Step Two: The Comprehensive Search

A separate professional trademark search firms are existing for the companies when their need of searching the trademark. These companies review the records of the PTO (go through existing

and pending application) , review state trademark office records for state trademark registration, and they perform a “common law” search of various journals, directories, press releases, domain names and Internet references to locate unregistered names and mark.

These professional search firms can save considerable time and money and more importantly, provide a more thorough search than that which an individual can conduct on his or her own, they also check for identical and phonetically equivalent marks for similar goods and services and will also check for foreign equivalents. They will charge for the searching of the marks. The report is typically divided into three sections: results gained from reviewing PTO registrations and applications; results gained from reviewing state trademark records; and the common law results.

TRADEMARK REGISTRATION PROCESSES

Preparing the application

- Once a mark has been selected and evaluated for use and registrability, an application for federal registration of the /mark should be prepared and filed.
- An application is provided by PTO
 - ✓ The name of the applicant
 - ✓ The citizenship of the applicant
 - ✓ The address of the applicant
 - ✓ The address of the applicant
 - ✓ An identification of the goods and or services offered under the mark
 - ✓ A drawing of the mark
 - ✓ A verification or declaration signed by the applicant or agent or attorney
- The application is based on actual use of the mark or the owner’s intent to use the mark.
- The process of moving an application through the PTO is called prosecution [(law) the institution and conduct of legal proceedings against a defendant for criminal behavior]
- The application must be in English.
- Electronically filed application are provided by the PTO
- Self application is also be prepared as the letter size (namely 8 ½ inches by 11 inches) paper, typewriter, double-spaced, with margins of at least 1 ½ inches at the left and top of the pages.
- The application should be written on only one side of the paper.
- The filing and prosecution of trademark application are governed by the TMEP [Trademark Manual of Examination Procedure]
- The PTO introduced on electronic filing system in 1998.
- The Trademark Electronic Application System [TEAS].Permits applicants to file numerous documents electronically.
- PTO considers the electronically filed document after transmission.

The applicant

- The mark can be made only by the owner of the mark or, in the case of intent –to-use application, by a person who has a bonafide to use the mark in commerce.



- Application may be natural persons or business entities such as corporation, partnership, association, unions or other organization.
- Government entities such as nations, states municipalities and other governmental bodies.
- The applicant name must be in correct legal form
- A mark should be identified in the application by the name set forth in its articles of incorporation.
- Clients often make mistakes in their corporate names or in the punctuation
- The certificate of registration will issue in the name of the application as set forth in the application
- If the application is a person or business that conducts business under a fictitious [fake] business name, the application will be rejected.
- The applicant is a partnership **For example:** "Balboa Gardens Partnership", the application should be made by the partnership itself and the state in which the partnership was organized.
- A trademark or service mark application is usually filed in the name of one party.
- The PTO has been reluctant [unwilling] to accept application by joint applicants.
- A joint venture or a partnership cannot be joint applicants

Identification of Goods or Services

The application must identify the goods and/or services offered or to be offered under the mark that is the subject of the application. Careful consideration must be given to drafting this part of the application. Goods and services are categorized by the PTO into forty-five separate classes, called **International Classes** because many other nations use this same classification system established by WIPO. Until 1973, the PTO used a different classification scheme, called the United States Classification Scheme. Each class requires a filing fee of \$335.

A detailed listing of the International Classes with numerous examples is found in Chapter 1400 of TMEP, available on the PTO's web site. If a mark is used for more than one class of goods or services, the applicant may either file a combined application, listing all of the goods and services. Some attorneys prefer to file separate application believing that a defect in regard to one class of goods or services in a combined application will hold up registration for the mark in all class.

The PTO requires that the identification of goods or services be as clear, accurate and concise as possible. Once the application filed, no other item can be added in the process of registration, a separate application should be applied.

REGISTRATION

- A registration will issue about twelve weeks after publication in the official gazette
- *If no notice of opposition is filed to the application*
- For an ITU [Intent-to-Use] application registration will occur after publication in the official Gazette.
- The PTO will issue a certificate of registration for the mark

- The term of the registration is presently ten years from the date the mark is registered [for registration issued before November 16, 1989, the term is twenty years]
- "TM" for Trademark & SM for service mark.

A SAMPLE REGISTRATION CERTIFICATE

United States of America
 United States Patent and Trademark Office



Reg. No. 3,665,378 WISDOM TO GO INC.(CALIFORNIA CORPORATION) Registered Aug. 11,2009 1829 WEST LYDIA LANE PHONIX, AZ 85041

Int. Cls.: 41 and 45 FOR: PERSONAL COACHING SERVICES IN THE FIELD OF SELF-IMPROVEMENT; EDU- CATIONAL SERVICES, NAMEYL , CONDUCTING SEMINARS AND WORKSHOPS IN THE FIELD OF SELF IMPROVEMENT; ENTERTAINMENT IN THE NATURE OF ON-GOING DRA 0 TELEVISION ANPR D1 OGRAMS IN THE FIELD OF SELF-IMPROVEMENT,IN CLASS 41 (U.S. CLS. 100, 101 AND 107).

SERVICE MARK

PRINCIPAL REGISTER

FIRST USE 1-19-2007; IN COMMERCE 1-19-2007.



FOR: PERSONAL ENRICHMENT SERVICES, NAMELY, PROVIDING SELF IMPROVEMENT COUNSELING; PROVIDING INFORMATION IN THE FIELD OF SELF-IMPROVEMENT VIA THE INTERNET AND PORTABLE MEDIUMS INCLUDING CELL PHONES AND VIDEO PHONES, IN CLASS 45 (U.S. CLS. 100 AND 101).

FIRST USE 1-19-2007; IN COMMERCE 1-19-2007.

David J. Kappas

Director of the United States Patent and Trademark Office

Abhishek
 Principal
 Sangsri College of Engineering
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NO CLAIM IS MADE TO THE EXCLUSIVE RIGHT TO USE "ONE MINUTE", APART FROM THE MARK AS SHOWN.

THE COLOR(S) BLACK, RED, WHITE, GOLD, YELLOW, RUST AND MAGENTA IS/ARE CLAIMED AS A FEATURE OF THE MARK.

THE MARK CONSISTS OF THE WORDING "THE ONE MINUTE ZONE", WITH THE LETTERS "ONE" FORMING BOTH "ONE" AND PART OF THE WORD "ZONE", AND A SUN DESIGN RADIATING OUT FROM THE CENTER OF THE LETTER "O". THE COLORS BLACK, RED, WHITE, GOLD, YELLOW, RUST AND MAGENTA ARE CLAIMED AS A FEATURE OF THE MARK. THE WORDS "THE" AND "MINUTE" ARE IN THE COLOR BLACK, THE LETTER "Z" AND THE LETTERS "ONE" ARE IN THE COLOR RED AND OUTLINED IN THE COLOR WHITE, THE CENTER OF THE SUN DESIGN IN THE LETTER "O" IS IN THE COLOR WHITE, THE OUTER SUN DESIGN IS IN THE COLOR GOLD, AND THE LINES RADIATING FROM THE SUN DESIGN ARE IN THE COLORS YELLOW, GOLD, RUST AND MAGENTA.

SER. NO. 76-683,444, FILED 10-29-2007. JOHN

GARTNER, EXAMINING ATTORNEY

*Note: The seal will be a gold embossed seal similar to what appears on the current cover bind

REQUIREMENTS TO MAINTAIN YOUR FEDERAL
TRADEMARK REGISTRATION

WARNING: YOUR REGISTRATION WILL BE CANCELLED IF YOU DO NOT

FILE THE DOCUMENTS BELOW DURING THE SPECIFIED TIME PERIODS.

Requirements in the First /Ten Years

*** What and When to File:**

- **First Filing Deadline:** You must file a Declaration of Use (or Excusable Nonuse) between the 5th and 6th years after the registration date. See 15 U.S.C. §1058. If the declaration is accepted, the registration will continue in force for the remainder of the ten-year period from the registration date, unless cancelled by an order of the Commissioner for Trademarks or a federal court.

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- **Second Filing Deadline:** You must file a Declaration of Use (or Excusable Nonuse) and an Application for Renewal between the 9th and 10th years after the registration date. See 15 U.S.C. §1059.

Requirements in Successive Ten Year Periods

* What and When to File:

- You must file a Declaration of Use (or Excusable Nonuse) and an Application for Renewal between every 9th and 10th-year period calculated from the registration date.

Grace Period Filings*

The above documents will be accepted as **timely** if filed **six-months** after the deadlines listed above with the payment of an additional fee.

The United States Patent and Trademark Office (USPTO) will NOT send you any future notice or reminder of these filing requirements.

***ATTENTION MADRID PROTOCOL REGISTRANTS:** The holder of an international registration with an extension of protection to the United States under the Madrid Protocol must also timely file the Declarations of Use (or Excusable Nonuse) referenced above at the USPTO based on the U.S. registration date (not the international registration date). However, the grace periods for these registrations are different, as is the time period for filing the declarations of use due every ten years after the registration date. The declarations due every ten years must be filed within six-months before expiration of the ten year period. In addition, there is no grace period for the declaration due between the 5th and 6th years after the registration date, and there is a three-month grace period for the declarations due every ten years. See 15 U.S.C. §1141k. Further, owners of these registrations do not file renewal applications at the USPTO, but instead must file a renewal of the underlying international registration at the International Bureau of the World Intellectual Property Organization, under Article 7 of the Madrid Protocol, before the expiration of each ten-year term of protection from the date of the international registration. See 15 U.S.C. §1141j. For more information and renewal forms for the international registration, see <http://www.wipo.int/madrid/en/>.

NOTE: Fees and requirements for maintaining registrations are subject to change. Please check the USPTO website for further information. You can file the registration maintenance documents referenced above online at <http://www.uspto.gov>.

* Note: The seal will be a gold, embossed seal similar to what appears on the current cover bind

UNIT-3

LAW OF COPY RIGHTS

Introduction

Every year millions of Americans create original works like books, music, research and other forms of creative expression. All these creation are Intellectual Property and all of them are protected by copyright. Writers, editors and publishers, understanding copyrights issues are essential. Especially now that the production of counterfeit [imitating] and pirated goods, including written works, has become so prevalent.

In 2005 more than \$600 billion in pirated and counterfeited goods were recognized by WCO [World Customs Organization]. Now-a-days the internet has made copying and distributing protected material easier than ever before for avoiding copying the material. So, in order to protect yourself from IP theft, it's important to know the basics about rights.

Definition

“The legal protection given to published works forbidding anyone but the author from publishing or selling them. An author can transfer the copyright to another person or corporation, such as a publishing company.”

What is a Copyright?

- Copyright is a form of protection provided by U.S. Law to the authors of “**Original Works of Authorship**” fixed in any tangible medium of expression.
- The manner and medium of fixation are virtually unlimited.
- Creative expression may be captured in words, number, notes, sounds, pictures or any other graphic or symbolic media.
- The subject matter of copyright is extremely broad, including literary, dramatic, musical, artistic, audiovisual and architectural works.
- Copyright protection is available for both published and unpublished works.

History

- In England prompted the first insistence upon protection for publication of books
- Bookbinders and printers demanded protection from copying of books.
- Authors also began to demand protection from unauthorized copying and demanded to share in the financial rewards
- Finally, in 1710, parliament enacted the first copyright statute [Act/law], the Statute of Anne [Named after Anne, Queen of Great Britain, the Statute become the foundation for British and American Copyright Law]

- The first copyright law is enacted under the new U.S. Constitution, Protecting books maps and charts for 14 years with privilege of renewal for another 14 years
- Copy right registration is made in the U.S. district court where the author or proprietor resides.
- The first copyright entry, "The Philadelphia Spelling Book" by John Barry, is registered in
- U.S. District court of Pennsylvania. Protection is for 14 years with a renewal period of author 14 years.

Common Law Right

- The enacted the first copyright act in 1790 and the first federal copyright registration were issued.
- Until January 1, 1978 [the effective date of the 1976 copyright Act] the U.S had a dual system of copyright protection.
- Until 1978, an author has a perpetual common law right to their unpublished works.
- Once the work was published, however, the common law perpetual copyright was extinguished and protection was afforded by virtue [quality] of the 1909 act, provide protection up to fifty-six years.
- Publication is the distribution of copies of a work to the public for sale or other transfer of ownership, by rental lease, or lending.
- The dual nature of copyright protection was complex, often led to controversy
- The 1976 act eliminated the distinction between unpublished and published works.
- **For Example:** Ernest Heming way's a farewell to Arms [Published in 1929], are governed by the act in existence on the date of their publication. Heingway's book would thus be governed by the 1909 act.
- Just as trademark rights arise from use and not from registration with PTO
- A copyright registration from the copyright office provides certain advantages to author's of work, including the following.
 - Registration establishes a public record of the copyright claim
 - Before an infringement suit may be filed in court, registration is necessary for works of U.S origin
 - If made before or within five years of publication, registration will establish Prima facie evidence in court of the validity of the copyright and of the facts stated in the certificate and
 - If registration is made within three months after publication of the work or prior to an infringement of the work, statutory damages and attorney's fee will be available to the copyright owner in court action
- Copyright protection generally lasts until seventy years from the death of the author.
- The 1976 copyright act is found at 17 U.S.C. §§101-1101 and it was amended for several times.
- In 1980, specific protection was afforded to computer programs as works entitled to copyright protection.



- Copyright Act © represents
- Another 1998 amendment to copyright law is the Digital Millennium Copyright act.

The United States Copyright Office:

Register of Copyright, Copyrights office, Library of Congress,
101 Independence Avenue SE, Washington,
DC 20559-6000

- The copyright office is not permitted to give legal advice and will not offer guidance on matter such as disputes, suits against possible infringers or other matters related to copyright.
- Among the more useful publications and materials are the following:
- Forms for copyright registration
- Circular 1, "Copyright Basics",
- Circular 2, "Publication on copyrights",
- Circular 3, "Copyright Notice",
- Circular 4, "Copyright Fees"
- Circular 15, "Renewal of Copyright"
- Circular 15a, "Duration of Copyright"; and
- Circular 38a, "International copyright Relations of the United States"; and
- Circular 61, "Copyright Registration for computer Programs"
- *To order copyright publications, write to:*

**Library of Congress, Copyright Office, Publication section, LM-455,
101 Independence Avenue SE, Washington-DC20559-6000**

- Circulars and announcements are available via facsimile
- If you do not know the document number of the items you want, you may request that a menu be faxed to you
- All the data pertaining to copyrights are available in Internet
- The copyright office provides a free electronic mailing list, "NewsNet", that issues periodic e-mail messages on copyright issues
- Copyright office process the application via electronically

Originality of Material:

Introduction

- The limits of copyrightability are dictated [command] by federal statute
- According to 17 U.S.C § 102, copyright protection exists in original works [tangible medium]



- Thus, there are three basic requirements for copyrightability:
- A work must be original
- A work must be fixed in a tangible form of expression; and
- A work must be a work of authorship

Originality of Material

- To be eligible for copyright protection
- Material must be original
- Meaning
- Independently created
- Posses a modicum of creativity
- It should not confused with novelty, worthiness or aesthetic [dealing with beauty] appeal
- “Originality” thus does not mean “first”, it merely means “independently created”,
- A slight amount of “creative spark”.

Fixation of Material :(17U.S.C. § 101

- The copyright act protects works of authorship that are “fixed in any tangible medium of expression”.
- A work is “fixed”:
- When it is embodied [existing in broad form]
- Phonorecord and is sufficiently permanent
- **Stable to permit it to be perceived, reproduced or communicated for a period of more than transistory [temporary] duration**
- Thus there are two tangible categories
- Copies: A copy is a material object from which a work can be perceived, reproduced or communicated, either directly by human perception or with the help of a machine.
- Phonorecord: A Phonorecord is a material object in which sounds are fixed and from which the sounds can be perceived, reproduced or communicated either directly by human percception or with the help of a machine.

Works of Authorship: (17 U.S.C § 102)

- The copyright act provides that copyright protection subsists [support oneself] in original works of authorship fixed in any tangible medium of expression, now known or hereafter developed, from which they can be perceived, reproduced or otherwise communicated.
- The list is preceded by the phrase that works of authorship “include” those categories, demonstrating that the listed categories are not only types of works that can be protected, but are illustrate only
- Literary works



- Musical works
- Dramatic works
- Pantomimes and choreographic works
- Pictorial, graphic and sculptural works
- Motion pictures and other audiovisual works
- Sound recording and
- Architectural works

Exclusions from copyright protection:

Not all works are protected by copyright

- Ideas, Methods, or System
- Blank forms, Titles, short phrases and common property
- Public domain works
- Facts
- Computing and measuring devices

The Rights afforded by copyright law:

Introduction

- The copyright act provides that, subject to certain exceptions, the owner of a copyrights has the exclusive rights to do and to authorize any of the following:
- To reproduce the copyrighted work in copies or phonorecords
- To prepare derivative works based on the copyrighted work
- To distribute copies or phonorecords of the copyrighted work to the public
- To perform the copyrighted work publicly
- To display the copyrighted work publicly
- To perform the copyrighted work publicly by means of a digital audio transmission
- Unless exemption exists, unauthorized exercise of any of these rights by another is an infringement.

These exclusive rights, usually referred to as a "bundle"

Rights of Reproduction:

- The most fundamental of the rights granted to copyright owners is the right to reproduce the work
- A violation of the copyright act occurs whether or not the violator profits by the reproduction
- Only the owner has the right to reproduce the work
- Secretly taping a concert, taking pictures at a performance, or recording all violate the owner's right to reproduce



- The suggestion of congress, in 1978 a group of authors, publishers and users established a not-for-profit entity called Copyright Clearance Center [CCC]
- CCC grants licenses to academic, government and corporate users to copy and distribute the works
- It collects royalty fees, which are distributed to the authors
- Companies that photocopy articles from journals and magazines often enter into licensing arrangements with the CCC so they can make copies.

Rights to prepare Derivative works:

- Section 106 of the copyright Act provides that the owner of a copyright has the exclusive right to prepare derivative works based upon the copyrighted work
- This right is often referred to as the right to adapt the original work

Definition:

- "A derivative work is broadly defined as a work based upon one or more preexisting works, such as a translation, dramatization, fictionalized motion pictures version, abridgment condensation or any other form in which a work may be recast, transformed, or adapted.
- a work consisting of editorial revisions, annotations, elaborations, or other modifications is also a derivative work

New material represents original work of authorship

Rights of distribution and the first sale doctrine:

- Section 106 (3) of the copyright act provides that the owner of a copyright has the exclusive right to distribute copies or phonorecords of the work to the public by sale or other transfer of ownership
- A violation of the distribution right can arise solely from the act of distribution itself
- The distributor did not make an unlawful copy or the copy being distributed was unauthorized
- Thus, blockbuster video store can be liable for violating an owner's right to distribute
- Once the author has parted with ownership of copyrighted material, the new owner of a lawfully made copy can treat the object as his or her own
- The new owner the right to lend the book or movie to a friend, resell the work at a garage sale, or even destroy it.
- The first sale doctrine does not apply to or limit the author's exclusive rights to prepare derivative works or rights of public performance and
- Without permission of authorship the goods are not permitted to imported into the U.S.



Rights to perform the work publicly

- Section 106 [5] of the Copyright Act provided that in the case of all copyrighted works other than sound recording & works of architecture, the copyright owner has the exclusive right to display the work publicly.
- A display is “public” under the same circumstances in which a performance is “public”.
- Namely if it occurs at a place open to the public (or) at a place where a substantial number of persons outside of the normal circle of a family.

Copyright Ownership Issues [17 U.S.C. § 201(a)]:

- Copyright in a work protected under the copyright act vests [provide with power and authority] in the author or authors of the work
- Issues about ownership arise when more than one person creates a work

Ownership of a physical object is separate and distinct from ownership of the copyright embodied in the material object

- Unless copyright has been explicitly conveyed with those physical articles, the original authors generally retain all other rights associated with the works.

Joint Works [intent to create a unitary whole]

- A joint work is a work prepared by two or more authors with the intention that their contributions be merged into inseparable or interdependent parts of a unitary whole.
- One copyright exists in the created works
- Joint authors are those who “mastermind” or “super mind” the creative effort.

Ownership Rights in Joint Works

- If individual are authors of a joint work, each owns an equal undivided interest in the copyright as a tenant in common, [each has the right to use the work, prepare derivative works, display it without seeking the other coauthor’s permission].
- If profits arise out of such use, an accounting must be made so, that each author shares in the benefits or proceeds.
- The death of a coauthor, his or her rights pass to heirs who then own the rights in common with the other coauthor.

Ownership in Derivative or Collective Works

- The author of the original book has rights only to his or her work and cannot reproduce or perform the derivative work without permission.

- If a work such as a book is created by one person who intends it to be complete at the time and illustrations are later added to it by another, the work cannot be a joint work because there was no intention of the parties to create a unitary whole at the time of their creation.
- The author of the derivative work cannot create further works based on the original book without permission and cannot reproduce the original work without permission.
- Multiple ownership rights may also arise if separately copyrightable works are compiled into a collection.
- **For Example:** If essays written by Jerry Seinfeld, Ellen DeGeneres, and Paul Reiser are collected into a humor anthology by Bill Jones (with permission of the original authors), the original authors retain their exclusive rights (such as rights to reproduce, distribute, and perform) in their respective essays. No joint work is created because there was no intent at the time the separate essays were created to merge them into a unitary whole. No derivative work is created because the original works have not been transformed in any way and nothing new has been added to them. The anthology by the compiler, Bill Jones, is a collective work and pursuant to section 201(c) of the act, Jones acquires only the right to reproduce and distribute the contributions as part of the particular collective work or any revision of the collective work.

Works Made for Hire

- The general rule is that the person who creates a work is the author of that work and the owner of the copyright therein, there is an exception to that principle: the copyright law defines a category of works called **works made for hire**.
- If a work is “made for hire”, the author is considered to be the employer or commissioning party and not the employee or the actual person who created the work
- The employer or commissioning party may be a company or an individual.
- There are two types of works that are classified as works made for hire; works prepared by an employer within the scope of employment and certain categories of specially ordered or commissioned works.

Copyright Registration

- A work is “created” when it is fixed in a copy or phonorecord for the first time.
- Although not required to provide copyright protection for a work, registration of copyright with the Copyright Office is expensive, easy and provides several advantages, chiefly, that registration is a condition precedent for bringing an infringement suit for works of US origin.
- To register a work, the applicant must send the following three elements to the Copyright Office: a properly completed application form, a filing fee, and a deposit of the work being registered.
- Registration may be made at any time within the life of the copyright.

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THE APPLICATION FOR COPYRIGHT REGISTRATION

- The following persons are entitled to submit an application for registration of copyright:
- the author (either the person who actually created the work or, if the work is one made for hire, the employer or commissioning party)
- the copyright claimant (either the author or a person or organization that has obtained ownership of all of the rights under the copyright originally belonging to the author, such as a transferee)
- the owner of exclusive right, such as the transferee of any of the exclusive rights of copyright ownership (for example, one who prepares a movie based on an earlier book may file an application for the newly created derivative work, the movie); and
- the duly authorized agent of the author, claimant, or owner of exclusive rights (such as an attorney, trustee, or anyone authorized to act on behalf of such parties)

Application Forms

- The Copyright Office provides forms for application for copyright registration.
- Each form is one 8 ½ by 11" (inches) sheet, printed front and back.
- An applicant may use photocopies of forms
- The Copyright Office receives more than 6,00,000 applications each year, each application must use a similar format to ease the burden of examination.
- The type of form used is dictated by the type of work that is the subject of copyright.

For example: One form is used for literary works, while another is used for sound recording.

Following are the forms used for copyright application.

- **Form TX** (Literary works, essays, poetry, textbooks, reference works, catalogs, advertising copy, compilations of information, and computer programs)
- **Form PA** (Pantomimes, choreographic works, operas, motion pictures and other audiovisual works, musical compositions and songs.
- **Form VA** (Puzzles, greeting cards, jewelry designs, maps, original prints, photographs, posters, sculptures, drawings, architectural plans and blueprints.
- **Form SR** (Sound recording)
- **Form SE** (periodicals, newspapers magazines, newsletter, annuals and Journals. Etc.


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Notice of copyright

- Since March 1, 1989 (the date of adherence by the United States to the Berne Convention), use of a **notice of copyright** (usually the symbol © together with the year of first publication and copyright owner's name) is no longer mandatory, although it is recommended and offers some advantages.
- Works published before January 1, 1978, are governed by the 1909 copyright Act.
- Under that act, if a work was published under the copyright owner's authority without a proper notice of copyright, all copyright protection for that work was permanently lost in the United States.
- With regard to works published between January 1, 1978, and March 1, 1989, omission of a notice was generally excused if the notice was omitted from a smaller number of copies, registration was made within five years of publication, and a reasonable effort was made to add the notice after discovery of its omission.

International Copyright Law

- Developments in technology create new industries and opportunities for reproduction and dissemination of works of authorship.
- A number of new issues have arisen relating to the growth of electronic publishing, distribution, and viewing of copyrighted works.
- Along with new and expanded markets for works comes the ever-increasing challenge of protecting works from piracy or infringement.
- Copyright protection for computer programs
- Copyright protection for Automated Databases
- Copyright in the Electronic Age
- The Digital Millennium Copyright Act

LAW OF PATENTS

- The word *Patent* is a shorthand expression for "letters patent"
- A **Patent** is a grant from the U.S. government to exclude others from making, using, or selling another person's new, nonobvious, and useful invention in the United States for the term of patent protection.
- It is protected for 20 years
- Under patent law, inventors can enjoin the making, using or selling of an infringing invention even if it was independently created.
- A Patent allows its owner to exclude others from using the owner's invention; it does not provide any guarantee that the owner can sell the invention.
- To obtain a patent, an inventor must file an application with the PTO, same agency of the Department of Commerce that issues trademark registration.

- The application must describe the invention with specificity.
- The application will be reviewed by a PTO examiner, and, if approved, the patent will issue.
- The U.S. Constitution provides that Congress shall have the power “to promote the progress of science and useful arts, by securing for limited times to authors and inventors the exclusive rights to their respective writing and discoveries”.
- Patent promote the public good in that patent protection incentivizes inventors.

Advantages of Patents

- Patents promote the public good in that patent protection incentivizes inventors
- The introduction of new products and processes benefits society.
- In return for the full disclosure to the public of specifics of the invention, thus advancing science and technology, the inventor is given a limited period of time within which to exploit his or her invention and excluded others from doing so.
- Inventors are thus incentivized to create new products, and the public benefits from inventions that ultimately will fall into the public domain.

Rights Under Federal Law

- Patent law derives from the Constitution.
- In 1790, pursuant to the direction provided in the Constitution, Congress passed the first patent, which in large part relied upon English Law.
- Three years later, the statute was replaced with a new act authored by *Thomas Jefferson*.
- These early acts provided the structural framework for U.S patent law and specified the four basic conditions, still existing, that an invention must satisfy to secure patent protection:
 - The invention must be a utility, design, or plant patent
 - It must be useful (or ornamental in the case of a design patent or distinctive in the case of a plant patent);
 - It must be novel in relation to the prior art in the field; and
 - It must not be obvious to a person of ordinary skill in the field.
- Revision of federal patent statutes occurred in 1836 when the Patent Office was created and again in 1870 and 1897.
- Thereafter, in 1952, Congress enacted a new patent act, codified in title 35 of the United States Code (U.S.C), it is last major revision to federal patent statutes
- Development of patent law has evolved primarily through federal court decisions rather than the legislature
- In 1982, Congress created a new court, the Court of Appeals for the Federal Circuit (CAFC), the exercise exclusive jurisdiction over all cases involving patent issues and to promote uniform interpretation of the U.S. patent statutes, which until then had been interpreted in often inconsistent ways by the various federal courts of appeals throughout the nation.

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- Moreover, some inventions such as computer programs, are protectable under copyright law as well as patent law.

Patent Searching Process

The Need for a Search:

- Patentability requires novelty and nonobviousness.
- The patentability search, sometimes called a novelty search
- A search is recommended to determine the feasibility of obtaining a patent.
- A novelty search is somewhat limited in scope and is designed to disclose whether an application will be rejected on the basis of lack of novelty or obviousness.
- A novelty search can usually be completed for less than \$1,000.
- If an invention is intended for immediate commercial use or sale, an additional search, call an infringement search or investigation, is often conducted concurrently with the novelty search.
- This novelty search is thus more expensive

Searching Methods:

- The PTO provides public search facilities for patent searching.
- Searching is free and the PTO allows searchers to review issued patents, complete with drawings.
- Searching can be done either in the main public search room or in the examiners' search areas where examiners will assist in searching. (The patent search room contains copies of all U.S. issued patents from 1790 to present as well as many foreign patents).
- The PTO employs a classification system that provides for the storage and retrieval of patent documents
- The patent examiners in the course of examining patent applications, the system is also used by searchers, and classification files are divided into subclasses.
- Most classes have approximately three hundred sub classes

Patent Application Process

Overview of the Application Process

- The process of preparing, filing, and shepherding a patent application through the PTO towards issuance is called "prosecution".
- An application may be filed by the inventor himself or herself or, as is more usual, by a patent attorney.
- Only 20% of all applications are filed by inventors without the assistance of attorneys.
- The application is filled with PTO, it will be assigned to one of more than 3500 patent examiners having experience in the area of technology related to the invention who will

review the application and conduct a search of patent records to ensure the application complies with the statutory requirements for patents.

- The process may continue for several rounds.
- A Notice of Allowance will be sent to the applicant, which specifies an issue fee that must be paid to the PTO in order for the patent to be granted.
- Until 2000 all patent application were maintained in confidence, but after November 2000 they were published
- It takes one to three years to prosecute a patent, and costs and fees can range from \$5000 to more than \$30000 with fee generally ranging for \$10000 to \$12000

Patent Practice

- While preparing trademark and copyright applications is relatively straightforward, preparing a patent application requires skillful drafting as well as knowledge in the relevant fields, whether that is biotechnology, chemistry, mechanical engineering, physics, computers, pharmacology, electrical engineering, and so forth.
- They are divided into different groups, such as a mechanical group, a biotech group, and an electrical group.
- Many patent attorneys possess both a law degree and an advanced degree in engineering, physics, chemistry, or the like.
- To represent patent applicants before the PTO, an attorney must be registered to practice with the PTO.
- An attorney must pass the Patent Bar, which requires the attorney to demonstrate background in science or engineering.
- The examination is very difficult it is a multiple choice questions, and the pass rate tends to hover around one-third.
- A list of attorneys and agents registered to practice before the PTO is available from the Government Printing Office located in Washington, DC. Alternatively, the PTO web site (<http://www.uspto.gov/web/offices/dcom/olia/oed/roster/>) provides an index to the more than 18000 attorneys and agents who are licensed to practice before the PTO.

Confidentiality of Application Process and Publication of Patent Application

- More than 200 years, all patent applications filed with the PTO were maintained in strict confidence throughout the entire application process.
- Only when the patent issued was the file wrapper open to public inspection.
- Under the American Inventors Protection Act (AIPA) of 1999, however, which took effect in November of 2000, the PTO now publishes utility and plant applications eighteen months after their filing
- If the applicant later decides to apply for a patent in a foreign country, the applicant must provide notice of this foreign filing to the PTO within forty-five days or the application will

be regarded as abandoned.

- The intent of the new law is to harmonize U.S. patent procedures with those of other countries, almost all of which publish patent applications after an initial period of confidentiality.
- The new act protects inventors from having their inventions infringed by providing that patentees can obtain reasonable royalties if others make, used, or sell the invention during the period between publication and actual grant of the patent.

Types of Application

1. Provisional Application
2. Utility Application
3. Design Application
4. Plant Application
5. Continuation Application
6. PCT (Patent Cooperation Treaty) Application
7. Divisional Application

Preparing the Application

- Title
- Cross-references to related applications
- Background
- Summary of invention
- Brief description of drawing
- Detailed description of the invention
- Claims

Patent Prosecution Flowchart

Ownership Rights

- Patents are items of personal property and thus may be owned, sold, licensed, or devised by will.
- Applications for patent must be filed by the actual inventor of the article, process, design, or plant.
- If there is more than one inventor, the application must be signed by all inventors.
- In many instances, employees are required to sign agreements with their employers whereby they agree that any invention or discovery invented by them while on the job will belong to the employer and that they will agree to assist and cooperate in any manner, including signing applications for patents, to ensure the employer's rights are protected

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- Although the oath in the patent application is signed by the individual inventor, when the application is filed, a simultaneous assignment is also filed identifying the employer as the “true” owner of the application and the invention.

Ownership transfer

- As objects of intellectual property or intangible assets, **patents** and patent applications may be **transferred**.
- A transfer of patent or patent application can be the result of a financial transaction, such as an assignment, a merger, a takeover or a demerger, or the result of an operation of law, such as in an inheritance process, or in a bankruptcy.
- The rationale behind the transferability of patents and patent applications is that it enables inventors to sell their rights and to let other people manage these intellectual property assets both on the valuation and enforcement fronts. As The Economist put it,

"Patents are transferable assets, and by the early 20th century they had made it possible to separate the person who makes an invention from the one who commercialises it. This recognised the fact that someone who is good at coming-up with ideas is not necessarily the best person to bring those ideas to market.


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TRADE SECRETS LAW

- The type of information that must be kept confidential in order to retain its competitive advantage is generally called a "Trade Secret"
- A trade secret is any information that can be used in the operation of a business or other enterprise that is sufficiently valuable and secret to afford an actual or potential economic advantage over others.
- Restatement (Third) of Unfair Competition § 39 (1995).
- A recipe, a formula, a method of conducting business, a customer list, a price list, marketing plans, financial projection, and a list of targets for a potential acquisition can all constitute trade secrets.
- Generally, to qualify for trade secret protection, information must
 - ✓ be valuable;
 - ✓ not be publicly known; and
 - ✓ be the subject of reasonable efforts to maintain its secrecy
- The rapid pace of technology advances the ease with which information can now be rapidly disseminated and the mobility of employees require businesses to devote significant effort to protecting their trade secrets.
- If trade secrets were not legally protectable, companies would have no incentive for investing time money and effort in research and development that ultimately benefits the public at large.
- Trade secrets law not only provides an incentive for companies to develop new methods and processes of doing business but also, by punishing wrongdoers, discourages improper conduct in the business environment.
- **The Law Governing Trade Secrets:**
- Trademarks, copyrights, and patents are all subject to extensive federal statutory schemes for their protection, there is no federal law relating to trade secrets, and no registration is required to obtain trade secret protection.
- Most trade secret law arises from common law principles, namely, judge-made case law.
- The first reported trade secret case in the United States was decided in 1837 and involved manufacturing methods for making chocolate.


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- In 1939, the Restatement of Torts (a wrongful act or an infringement of a right) adopted a definition of a trade secret, and many states relied on that in developing their body of case law, leading to greater consistency in the development of trade secrets law.
- Additionally 1979, the National Conference of Commissioners on Uniform State laws drafted the uniform Trade Secrets Act (UTSA) to promote uniformity among the states with regard to trade secrets law.
- The UTSA was amended in 1985.
- The following definition of trade secret has been adopted by the UTSA:

Trade secret means information, including a formula, pattern, compilation, program, device, method, technique or process that:

- ✓ Derives independent economic value, actual or potential, from not being generally known to, and not being readily ascertainable by proper means by, other persons who can obtain economic value from its disclosure or use, and
- ✓ is the subject of efforts that are reasonable under the circumstance to maintain its secrecy.

DETERMINATION OF TRADE SECRET STATUS:

Restatement of Torts (a wrongful act or an infringement of a right) §757 cmt.b lists six factors to be considered in determining whether information qualifies as a trade secret. Courts routinely examine these factors to determine whether a company's information constitutes a trade secret.

The extent to which the information is known outside the company:

- Although information may be known to other outside the company and still qualify as a trade secret, the greater the number of people who know the information, the less likely it is to qualify as a trade secret.
- Secrecy need not be absolute.

The extent to which the information is known within the company:

- Although an employer or company is permitted to disclose confidential information to those with a demonstrated "need to know" the information.
- If the information is widely known within the company, especially among those who have no business need to know the information, it may not qualify as a trade secret.


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The extent of the measures taken by the company to maintain the secrecy of the information:

- One claiming trade secret protection must take reasonable precautions to protect the information.
- Courts are unlikely to protect information a company has not bothered to protect.
- A company is not obligated to undertake extreme efforts to protect information, but reasonable precautions are required.
- Some experts predict that courts will likely require advanced security measures to protect trade secrets transmitted via e-mail, including encryption and protocols to ensure confidentiality.
- **The extent of the value of the information to the company and its competitors:**
- If information has little value either to its owner or to the owner's competitors, it is less likely to qualify as a trade secret.
- Conversely, information that is valuable to a company, such as the recipe for its key menu product, and that would be of great value to the company's competitors is more likely to be protectable trade secret.
- **The extent of the expenditure of time, effort, and money by the company in developing the information:**
- The greater the amount of time, effort, and money the company has expended in developing or acquiring the information, the more likely it is to be held to be a protectable trade secret.
- **The extent of the ease or difficult with which the information could be acquired or duplicated by other:**
- If information is easy to acquire or duplicate, it is less likely to qualify a trade secret.
- Similarly if the information is readily ascertainable from observation or can be easily reproduced, it is less likely to be a trade secret.
- On the other hand, if it can be reverse engineered only with significant expenditures of time, effort, and money, the product may retain its status as a trade secret.
- **LIABILITY FOR MISAPPROPRIATION OF TRADE SECRETS:**
- Misappropriation of a trade secret occurs when a person possesses, discloses, or uses a trade secret owned by another without express or implied consent and when the person
 - used improper means to gain knowledge of the trade secret;

- knew or should have known that the trade secret was acquired by improper means; or
- Knew or should have known that the trade secret was acquired under circumstances giving rise to a duty to maintain its secrecy.
- The term *improper* means includes bribery, theft, and misrepresentation, breach of duty to maintain secrecy, or espionage (the practice of spying or of using spies, typically by governments to obtain political and military information) or other means.
- Thus, misappropriation occurs either when a trade secret is lawfully acquired but then improperly used or when the trade secret is acquired by improper means.
- **Absence of Written Agreement:**
- A written agreement prohibiting misappropriation of trade secrets can be enforced through an action for breach of contract; a company's trade secrets can be protected against misappropriation even in the absence of any written agreement between the parties.
- A party owning trade secrets can bring an action in tort for breach of the duty of confidentiality, which duty can arise even without an express agreement.
- Courts will impose a duty of confidentiality when parties stand in a special relationship with each other, such as an agent-principal relationship (which includes employer- employee relationship) or other fiduciary (involving trust, especially with regard to the relationship between a trustee and a beneficiary) or good faith relationship
- Courts have consistently held that employees owe a duty of loyalty, fidelity, and responsibility to their employers.
- In fact, more trade secret cases are brought in tort for breach of confidentiality than in contract for breach of written agreements.

For example: If XYZ company is attempting to make a sale to Jones and informs Jones that the XYZ product is superior to that of competitors because it involves a new breakthrough in technology and explains the trade secret, courts would likely find that Jones is subject to a duty not to disclose the information. Similarly, if XYZ co., explains its trade secrets to its bankers in an attempt to obtain financing, the bankers would likely be precluded from disclosing or using the information. Such implied contracts to protect the information generally arise when the parties' conduct indicates they intended the information to be kept confidential or impliedly agreed to keep it confidential.



Misappropriation by Third Party:

A number of other parties may also have liability for misappropriation of trade secrets if they knew or should have known they were the recipients of protected information.

For example:

1. Assume Lee is employed by XYZ co., In course of time Mr.Lee learns valuable trade secret information. If Mr.Lee resigns jobs and begins working for new company and it prohibited for both in using the information. He may not misappropriate the information because he was in an employee-employer relationship with XYZ company. New company should not use the information if Mr Lee reveals, if it happen so, then XYZ Company would generally prefer to sue New Company inasmuch as it is far likelier to have deep pockets, meaning it is more able to pay money damages than is an individual such as Lee.
2. If New Company has no reason to know the information was secret or that Mr. Lee may not reveal it, New Company would not have liability for such innocent use of the information. Similarly, if trade secret information were innocently obtained by New Company by mistake, New Company would have no liability for subsequent use or disclosure of the information.

Written Agreement:

Employers are generally free to require employee, independent contractors, and consultants to sign express agreements relating to the confidentiality of information. These agreements are usually enforced by courts as long as they are reasonable. The agreements usually include four specific topics:

- Ownership of Inventions
- Non-disclosure Provisions
- Non-solicitation Provisions
- Non-competition Provisions
- ✓ Purpose
- ✓ Reasonableness
- ✓ Consideration


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PROTECTION FOR SUBMISSION:

Submission to Private Parties:

- In many instances individuals wish to submit an idea for an invention, process, game, or entertainment show to a company or business in the hope that the company or business will market and develop the idea and the individual will be compensated for the idea?
- Idea submission disputes frequently arise in the entertainment industry. In one case an individual claimed that the producers of the Cosby Show (American comedian) misappropriated her idea for a television program portraying a wholesome and loving African American family. A court held there were no people and the idea was so general as to lack the element of concreteness to be protectable.
- The solution to such a dilemma is for the "inventor" to submit the idea pursuant to an evaluation agreement, or submission agreement, whereby the other party agrees to evaluate the idea only for the purpose of considering a future transaction between the parties and further agrees not to circumvent the submitter or to disclose the idea to others.

Submission to Government Agencies:

- Private companies that present bids to government agencies in the hope of obtaining a government contract are often required to disclose confidential or trade secret information to the agency.
- Under freedom of information act (both at the state and federal levels), the proposal might later be released to any member of the public requesting the document, thus resulting in loss of confidential information to possible competitors.
- The protected information is usually blocked out.
- If a government agency discloses trade secret information, the owner may have a cause of action for an unconstitutional taking of private property and may be awarded compensation if the owner had a reasonable expectation of confidentiality.

REMEDIES FOR MISAPPROPRIATION:

- A trade secret owner may request a variety of remedies from a court. Among them are the following:
- **Injective relief:** In many cases, a trade secret owner is more interested in ensuring the defendant cease use of the trade secret (or is precluded from commencing use) than in recovering damages. In cases in which money damages are not sufficient to protect a trade secret owner, a court may issue an injunction. A court may also issue an injunction to compel the

- defendant to surrender or destroy trade secret information. In fact, courts may issue injunctions' to prevent inevitable disclosure, reasoning that even if a former employer cannot show a particular secret has been taken, it is inevitable that key employees will eventually disclose what they know to a new employer.
- **Money damages:** A trade secret owner whose information has been misappropriated may recover money damages from the defendant. The Plaintiff may recover its lost profits as well as the profits made by the defendant. Alternatively, the plaintiff may seek and recover a reasonable royalty arising from defendant's use of the trade secret. Punitive damages may also be awarded in cases in which the defendant's conduct is reckless, willful, and intentional. The USTA provides that punitive damages not exceed more than twice the compensatory damages awarded.
- **Attorneys' fees and costs:** In most cases, the parties bear their own attorneys' fees and costs. The UTSA, however, provides that reasonable attorneys' fees and costs may be awarded to the prevailing party if bad faith or willfulness is shown.

TRADE SECRET LITIGATION:

- If a trade secret is disclosed in violation of a written confidentiality agreement, and the parties cannot resolve the dispute themselves, an action for breach of contract may be brought, similar to any other breach of contract action.
- The plaintiff may add other causes of action as well, for example, for misappropriation in violation of a state trade secret law. If no written agreement exists, the plaintiff must rely upon case law or state statutes protecting trade secrets, or both.
- To protect itself against a lawsuit by another alleging trade secret violation, companies should require new employees who will have access to confidential information to acknowledge in writing that accepting employment with the new company does not violate any other agreement or violate any other obligation of confidentiality to which the employee may be subject.
- If grounds for federal jurisdiction exist (the parties have diverse citizenship and the claim exceeds \$75000), the action may be brought in federal court.
- The UTSA [Uniform Trade Secrets Act] provides that an action for misappropriation must be brought within three years after misappropriation is discovered or reasonably should have been discovered.
- In federal court, the action will be governed by the Federal Rules of Civil Procedure relating to federal civil actions generally.
- Most states have rules relating to civil procedure that are modeled substantially after the Federal Rules of Civil Procedure and likewise govern the litigation.

- If the defendant has a cause of action to assert against the plaintiff relating to the trade secret, it must be asserted by way of a counterclaim in the litigation so that all disputes between the parties relating to the information can be resolved at the same time.
- After the complaint, answer, and counterclaim have been filed, various motions may be made. Discovery will commence. The plaintiff and defendant will take depositions to obtain testimony from those who may have information about the case.
- Ultimately, if the matter cannot be resolved by private agreement, it will proceed to trial. The trade secret owner must prove misappropriation by a preponderance of the evidence. Either party may request a jury trial; otherwise, a judge will render the decision. Appeals may follow.
- One of the difficult issues in trade secret litigation arises from the fact that the trade secret sought to be protected often must be disclosed in the litigation so the judge or jury can evaluate whether the information is sufficiently valuable that it affords its owner a competitive advantage.
- Similarly, the owner's methods of protecting the information often must be disclosed so the fact-finder can determine whether the owner has taken reasonable measures to protect the alleged trade secrets.
- The dilemma faced by trade secrets owner is that they must disclose the very information they seek to protect.
- As technology progresses and the value of certain communication and entertainment inventions increases, trade secret litigation is becoming an increasingly common and high-stakes occupation.

TRADE SECRET PROTECTION PROGRAMS:

Trade secrets are legally fragile and may be lost by inadvertent disclosure or failure to reasonably protect them, companies should implement trade secret protection programs to safeguard valuable information. Because trade secret protection can last indefinitely, businesses should devote proper attention to the methods used to ensure confidentiality of information. Developing programs and measure to protect trade secrets is an easy way to demonstrate to a court that an owner values its information and takes appropriate measures to maintain its secrecy.

Physical protection

There are a variety of tangible measures a company can implement to protect trade secrets, including the following:

- Safeguarding information under lock and key;
- Protecting the information from unauthorized access;
- Forbidding removal of protected information from the company premises or certain rooms;
- Retaining adequate security during evening and weekends either through alarm systems or security services;
- Ensuring tours of the company premises do not expose outsiders to valuable processes or information;
- Using check-out lists when valuable equipment or information is removed from its normal location;
- Monitoring employees' use of e-mail and the Internet to ensure confidential information is not being disseminated;
- Using encryption technology and antivirus protection programs to protect information stored on computers;
- Educate employees on trade secrets and protection of trade secrets;
- Ensuring information retained on computers is available only on company networks so that access can be easily tracked.

Most companies will not need to implement all of the measures described above. Courts do not require absolute secrecy or that extreme measure be taken to protect information. Rather, reasonable measures will be sufficient to protect the status of information as trade secrets.

Contractual Protection

- Another method of protecting trade secrets is by contract, namely, requiring those with access to the information to agree in writing not to disclose the information to other or use it to the owner's detriment.
- Similarly, in licensing arrangements, trade secret owners should ensure the license agreements contain sufficient protection for trade secret information.
- Employers should use noncompetition agreements to ensure former employees do not use material gained on the job to later compete against the employer.
- With the advent of the Internet and the increased ease of electronic communications, employers have become concerned about the loss of trade secrets through dissemination over the Internet.
- It has been held that "*once a trade secret is posted on the Internet, it is effectively part of the public domain, impossible to retrieve*".

Contractual Protection

Companies can also rely on other complementary methods of protection to safeguard trade secrets. Any material that qualifies for copyright protection should be protected by registration, or at a minimum, by ensuring a copyright notice is placed on the material or document to afford notice to other of the owner's right and interest in the material.

UNFAIR COMPETITION

INTRODUCTION:

The law of unfair competition is based upon the notion that individuals should be protected from deceptive (looking down) and improper conduct in the marketplace. The law of unfair competition is found in case law, in state statutes prohibiting unfair business practices, in specific federal statutes, and in regulations promulgated by the FTC (Federal Trade Commission), the federal regulatory agency charged with protecting consumers from unfair or deceptive acts and practices.

The law of unfair competition continues to evolve as new methods of conducting business arise, such as electronic offers and sales through telemarketing, television infomercials, and the Internet. There are a number of theories and actions that can be used by injured parties to protect against unfair competition. In many instances, actions for unfair competition will be combined with other actions (such as those alleging trademark, copyright, or patent infringement) to provide a plaintiff a wide array of possible remedies.

For Example: a designer of scarves imprinted with fanciful designs may decide against applying for a design patent due to the expense involved and the short life cycle of fashion products. Protection against copying of the design may thus be available under the umbrella of unfair competition rather than under design patent law.

Section 43 of the Lanham Act (15 U.S.C § 1125) provides a federal cause of action to protect consumers against unfair competitive business practices. Moreover, section 43(a) protects **unregistered marks and names**, such as those that do not qualify for federal trademark registration because they are descriptive or perhaps used only in intrastate commerce.

The most common types of unfair competition are discussed more fully in this chapter but can be briefly summarized as follows:

- Passing off (or palming off), "Passing off" occurs when one party attempts to pass off or sell his or her goods or services as those of another.
- Misappropriation
- Right of Publicity
- False advertising
- Dilution, Either tarnishing another's mark or causing it to lose its distinctiveness through "blurring" is actionable as dilution
- Infringement of trade dress, adopting the overall concept of another's distinctive packaging or product image, generally called its "trade dress", so as to deceive consumers is an infringement of trade dress.

Generally, injured parties notify the wrongdoer prior to initiating litigation.

MISAPPROPRIATION:

- The doctrine of misappropriation first arose in *International News Service V. Associated Press*, 248 U.S. 215 (1918), in which the Supreme Court held that an unauthorized taking of another's property, in that case, news information, that it invested time and money in creating was actionable as misappropriation of property.
- In INS, news information originally gathered by the Associated Press relating to World War I was pirated by International News Service and sold to its customers.
- Because the news itself, as factual matter, could not be copyrighted, the plaintiff could not sue for copyright infringement.
- Instead it alleged that its valuable property right had been taken or misappropriated by the defendant.
- The Supreme Court agreed, noting that the defendant was "endeavoring to reap where it has not sown, and is appropriating to itself the harvest of those who have sown." *Id.* At 239-40. Because the defendant was not attempting to convince its subscribers that its news reports were from the plaintiff, an action for passing off would not lie. The defendant was misappropriating rather than misrepresenting.

RIGHT OF PUBLICITY:

- The right of publicity gives individuals, not merely celebrities, the right to control commercial use of their identities or personas.
- The right of publicity protects a commercial interest, the vast majority of cases involve celebrities inasmuch as they can readily show economic harm when their names, photographs, or identities are used to sell products or suggest a sponsorship of merchandise.
- Publicity rights are governed by state law.
- The right of publicity has evolved from the right of privacy, which protected against unreasonable invasions upon another person's solitude and provided remedies for the disclosure of private information.
- The right of publicity allows individuals to protect the marketability of their identities and punishes those who would unjustly enrich themselves by appropriating another's fame for profit-making purposes.
- Unpermitted commercial exploitation of an individual's persona would dilute the value of the persona, making it more difficult for the individual to commercialize his or her identity. Thus, remedies for infringement include injunctions to prevent further exploitation and monetary relief to compensate the individual whose right of publicity has been appropriated (including damages for injury to reputation recovery of the defendant's profits, and punitive damages in extreme cases

- Courts have articulated a number of reasons for uploading an individual's right to publicity, including the need to protect against confusion that would arise if consumers were led to believe individuals sponsor or approve products when they do not, the need to incentivize performers who provide entertainment and benefit society and should thus be provided with a protectable proper right in their identities.
- The right of publicity does not apply to non commercial uses; using another's name, likeness, or identity for news reporting, scholarship, or research is permissible.

NEW DEVELOPMENTS IN THE RIGHT OF PUBLICITY

- As is common with intellectual property rights in today's society, some of the new issues relating to the rights of publicity stem from increasing technological advances.
- Without prior permission one should not appear in the digital technology used movie.
- The international Trademark Association has proposed amending the U.S. Trademark Act to create a federal right of publicity with postmortem rights (although such rights would be limited to some specific period of duration after death).
- *Similarly, names, gestures, and likenesses are unprotectable under copyright law because they are titles or ideas rather than expressions.*
- Thus, in some instances, federal copyright law may control a plaintiff's rights, while in other instances; only the right to publicity will provide protection.
- **California recently passed** the Astaire Celebrity Image Protection Act (Cal.Civ.Code § § 3344-3346) to allow heirs of celebrities to block commercial uses of deceased celebrities' likenesses while allowing a "safe harbor exemption" to artistic uses, such as the digital insertion of President Kennedy's image into the movie Forrest Gump, or uses for news, public affairs, and so forth.

FALSE ADVERTISING:

- In 1943, the federal trademark law, the Lanham Act, was passed.
- Section 43(a) of the act (15 U.S.C. § 1125) prohibited false designations of origin, namely, descriptions or representations tending falsely to describe or represent goods or services.
- It was not an effective vehicle to use when a party made misrepresentations relating to the nature or quality of goods or services.
- Moreover, until the passage of the Lanham Act, Plaintiffs, an element that was often difficult to demonstrate.

- Although the individual states enacted statutes prohibiting false advertising, these statutes varied from state to state and were often ineffective to prohibit false advertising that was national in scope.
- The expansive language of section 43 of the Lanham Act, however, soon began to be used to protect not only against unregistered trademarks but also against nearly all forms of false advertising.
- In 1989 Congress amended the Lanham Act and broadened the scope of section 43 for infringement of trademarks (both registered and unregistered marks) and trade dress, while the other portion of the statute allows the assertion of claims for false advertising and trade libel.


Under section 43(a), whoever uses a false or misleading description or representation of fact or false designation of origin in commercial advertising or promotion or misrepresents the nature, qualities, or geographic origin of his or her or another person's goods, services, or commercial activities is liable to any person likely to be injured by such act (if the act is committed in interstate commerce)

For Example:

- a failure to disclose that advertised prices did not include additional charges;
- a statement that a pregnancy test kit would disclose results in "as fast as ten minutes" when a positive result would appear in ten minutes but a negative results might take thirty minutes;
- a claim that a certain motor oil provided longer life and better engine protection than a competitor's product when that claim could not be substantiated;
- a false claim that automobile antifreeze met an automobile manufacturer's standards;
- covering up a label stating "Made in Taiwan" that appeared on goods

INTERNATIONAL PROTECTION AGAINST UNFAIR COMPETITION:

- The United States has assumed certain obligations under international agreements in the arena of unfair completion, chiefly under the Paris Convention.
- The Paris Convention seeks to afford citizens of each of the more than 160 member nation's protection against unfair competition and trademark infringement and requires that member nations provide the same level of protection against unfair competition to citizens of other member nations as they do for their own citizens.
- The Paris Convention expressly prohibits acts that create confusion b y any means with a competitor, false allegations that discredit a competitor, and indications that mislead the public in regard to the nature or characteristics of goods.
- Section 44 of the Lanham Act (15 U.S.C§ 1126) implements the Paris Convention and expressly provides that any person whose country of origin is a party to any convention or treaty relating to the repression of unfair competition, to which the United States is also a party, is entitled to effective protection against unfair completion.


 Principal
 of Finance

UNIT-5

NEW DEVELOPMENTS OF INTELLECTUAL PROPERTY LAWS

NEW DEVELOPMENT IN TRADE MARKS LAW:


The Internet:

- Trademark owners throughout the world are struggling with new issues presented by increased electronic communication, primarily that occurring through the Internet.
- The Internet derives from a network set up in the 1970s by the Department of Defense to connect military and research sites that could continue to communicate even in the event of nuclear attack.
- In the 1980s, the National Science Foundation expanded on the system, and its first significant users were government agencies and universities.
- In the early 1990s, however, it became apparent that the system could provide a global communication network, allowing people from all over the world to talk with each other; send written messages, pictures, and text to each other; and establish web pages to advertise their wares and provide information to their customers.

Assignment of Domain Names:

- A company's presence on the internet begins with its address or domain name not only serves as a locator for a company but also functions as a designation of origin and a symbol of goodwill---a trademark.
- There are two portions to a domain name: the generic top-level domain, which is the portion of the name to the right of a period (such as .gov or .com) and the secondary level domain, which is the portion of the name to the left of a period (such as "kraft" in Kraft.com").
- Disputes frequently arise between owners of registered mark and owners of domain names whose domain names similar or identical to the registered marks.

Internet Corporation for Assigned Names and Numbers [ICANN]:

- To help resolve the problems in the domain names registration and use process
 - The government created the ICANN
- 

- It is a nonprofit corporation
- It is governed by a board of directors elected in part by various members of the Internet community.
- ICANN are authorized to register domain names ending with .com, .org and .net
- Registrations usually last one year, at which time they can be removed or will expire.
- Registration requires a representation that the person seeing to register the name is not doing so far an unlawful purpose and does not know of any infringement
- ICANN recently added seven new top-level domains, including .biz and .info

PROTECTING A DOMAIN NAME:

- People register well-known marks as domain names to prey on consumer confusion by misusing the domain name to divert customers from the legitimate mark owner's site. This practice is commonly called cybersquatting.
- There are three approaches for against cybersquatter:
 - ✓ An action can be brought under the Federal Trademark dilution Act
 - ✓ A civil suit can be instituted under the recent Anticybersquatting consumer protection Act, or
 - ✓ An arbitration proceeding can be instituted through ICANN's disputes resolutions process
- Cybersquatter and the dilution doctrine: Federal trademark dilution Act (15 U.S.C § 1125 (C))
- Cybersquatters and Anticybersquatting consumer protection Act (15 U.S.C § 1125 (d))

[ACPA: Anticybersquatting consumer Protection Act]

- ✓ To prevail in a civil action under ACPA, a plaintiff must prove three thing:
 1. The plaintiff's mark is a distinctive or famous mark deserving of protection
 2. The alleged cyber squatter's infringing domain name is identical to or confusingly similar to the plaintiff mark
 3. The cyber squatter registered the domain name is bad faith
- Resolving Disputes through the Uniform Domain Name Dispute Resolution Policy: [UDRP] 1999
- ✓ The allegedly wrongful domain name is identical or confusingly similar to the complainants' trademark;
- ✓ The domain name registrant has no legitimate interest in the domain name and
- ✓ The domain name is being used in bad faith



NEW DEVELOPMENT IN COPYRIGHT LAW:

- While acknowledging that clothing is a useful article and thus not subject to copyright protection, a New York Federal court ruled that lace design, copyrighted as writing and incorporated into wedding dresses, were protectable and enjoined another maker of wedding dresses from making or marketing copies. Similarly, detailed embroiders or some other two dimensional drawing or graphic work affixed to a portion of a garment may be copyrightable.
- A federal court in California recently held that while type fonts themselves are not protectable under copyright law, a software program that generated and created the typefaces was protectable.
- As soon as Stephen King sold his book riding the Bullet exclusively in an Internet format, an individual cracked the copyright protection software and posted free copies of the book on the Internet. The publishers responded by adopting stronger encryption technology. Similarly, in 2000, Mr. King suspended online publication of a serial novel because too many individuals were downloading the work without paying it.
- In late 1997 President Clinton signed into law the No Electronic Theft [NET] Act [amending 18 U.S.C §2319] to enhance criminal penalties for copyright infringement, even if the infringer does not profit from the transaction. The act also extends the statutes of limitations for criminal copyright infringement from three to five years, and allows law enforcement officers to use federal copyright law against online copyright violation, thereby extending the same copyright protection to the Internet that is provided to other media.
- In September 1999, the Clinton administration relaxed government restrictions on the export of encryption products and simultaneously introduced new legislation to give law enforcement agencies greater authority to combat the use of computers by terrorists and criminals and to create a new code cracking unit within the FBI [Foreign Bureau of Investigation].
- In mid-2000, president Clinton signed the Electronic signatures in Global and National Commerce Act, making digital execution, called e-signatures, as legally binding as their paper counterparts.
- In 2000, federal prosecutors in Chicago indicted seventeen people who called themselves "Pirates with Attitude" for pirating thousands of software program. The case was brought under the NET Act. Some of the individuals were former employees of Intel and Microsoft.

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- The copyright office has recommended that congress amend section 110 of the copyright Act to grant educators the right to transmit copyrighted works for distance learning if certain conditions are met.

NEW DEVELOPMENT IN PATENT LAW:

The patent Act has proven remarkably flexible in accommodating changes and development in technology. Thus advisement in technology generally has not necessitated changes in the stately governing patent protection.

Business method and software patent:

Many of the cutting-edge issues in patent law related to patents for computer software. For several years, the conventional wisdom has been that unless a computer program had significant commercial value and application patent protection was often counterproductive or ineffective in that the PTO often took two years to issue a patent, roughly the same time it took for the software program to become absolute.

Biotechnology patent:

Medicines, Science, agricultural and pharmacology present the other cutting-edge issues in patent law. Research into genes may hold the key to curing disease throughout the world. Agricultural research may hold the key to providing sufficient food for the world's ever-increasing population.

The development of strains of plants and crops that are resistant to brought and disease has also led to an increasing number of patents issued, and attendant litigation. In the field of "agbiotech".

American Investors Protection Act of 1999 [AIPA]:

The AIPA was signed into law in 1999 and represents the most significant changes to patent law in twenty years. Although some of the provisions of AIPA have been discussed earlier, its key subtitles are as follows:

- Inventors' Right Act of 1999
- The First Inventor Defense Act of 1999
- The patent term guarantee act of 1999
- The domestic publication of Foreign filed patent application act of 1999
- The optional Inter parts reexamination procedure Act of 1999

Introduction of International Patent protection:

The rights granted by a U.S Patent extend only throughout the U.S and have no effect in a foreign country. Therefore, an inventor who desires patent protection in other countries must apply for a patent in each of the other countries or in regional patent office.

- The Paris convention (already it is in previous units)
- The European patent organization
- Agreement on Trade-Related Aspects of IPR (already it is in previous units)
- The patent Law Treaty
- Foreign Filing Licenses
- Applications for United States Patents by Foreign applicants

The European patent organization:

The European Patent Organization (EPO) was founded in 1973 to provide a uniform patent system in Europe. A European patent can be obtained by filing a single application with the EPO headquartered in Munich (or its subbranches in The Hague or Berlin or with the national offices in the contracting nations). Once granted, the patent is valid in any of the EPO countries designated in the application and has the same force as patent granted in any one of the contracting nations.

International overview on intellectual property rights

Key issues related to IP internationally :

Ideas and knowledge are an increasingly important part of trade. Many products that used to be traded as low-technology goods or commodities now contain a higher proportion of invention and design in their value. Films, music recordings, books, computer software, on-line services, clothing, food, plants, biotechnology products and many others are bought and sold because of the information, creativity and identity they contain — not usually because of the plastic, metal, cloth, paper or other material used to make them.

- The WTO's Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS), negotiated in the 1986-94 Uruguay Round, introduced intellectual property rules into the multilateral trading system for the first time. It's one of the three main areas of work in the WTO, alongside trade in goods and services. The TRIPS Council's job is to monitor how countries are applying the TRIPS Agreement and to discuss issues that arise from that. The



balance is described in different ways. It's a balance between private rights (incentives to create) and public interest (ability to use or access the creations). It's also a balance between the short and long term.

- Long-term: society benefits from creations and inventions, including when the period of protection expires and they enter the public domain

Short-term: intellectual property protection is mostly limited in time (there are some exceptions). Generally, private rights are protected in the short-term as an incentive to create and invent. Where intellectual property protection has social costs, governments can meet their objectives for social welfare and development by adapting the protection through various exceptions and flexibilities, for example to tackle public health problems. Technology transfer -Intellectual property protection should contribute to technical innovation and the transfer of technology. Producers and users should benefit. So should economies and societies at large.

IP rights in international forums:

- The United States has been negotiating with 11 other countries to establish an international free trade arrangement known as the **Trans-Pacific Partnership Agreement, or TPP**. The parties have been proceeding slowly; the countries recently entered into their 19th round of discussions.
- International business disputes could potentially be mitigated if multi-country coalitions would enforce and respect international agreements. Although only a limited number of countries are involved in the TPP, establishing a framework for IP protection would send a message to other countries not to ignore international laws.
- India is one of a number of countries that have failed to adhere to international agreements concerning IP law. In 2012 alone, nine U.S. products protected by a patent had those patents either revoked or denied by India. While business litigation may resolve patent disputes within the U.S., U.S. laws cannot be imposed on an International forum.
- Companies that experiment with medicines to be submitted to the FDA go through anywhere between 5,000 and 10,000 medicines on average before being granted one approval.
- These companies typically invest more than \$1 billion dollars before being awarded a patent.
- In India, international agreements concerning IP rights have been ignored so that the country may grow its own domestic pharmaceutical industries. A failure to protect U.S. intellectual property might remove the incentive to dedicate time and resources to finding cures for pressing and ongoing diseases like cancer, since companies might not be willing to tackle more complex medical issues if there was no prospective payout.
- Business attorneys may help researchers litigate within the U.S. to protect their intellectual property rights. An attorney could investigate a business' individual situation and come up with a legal plan of action in order to combat copyright infringements.

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