Food resources

Food resources

- World food problem
- Changes caused by agriculture and overgrazing
- Effects of modern agriculture, fertilizer-pesticide problems, Water logging, Salinity

Food resources

Human beings need air, water and food to survive but out of these, food is an important material for the growth and functioning of body. Main food resources are :

Crops: Mainly crops providing grains like rice, wheat, maize, etc.

Vegetables and fruits: It includes vegetables and different types of fruits.

Animals and Birds: Animals like cow, goat, pig, camel and hen are utilised for food production.

Aquatic animals: This includes different types of fishes, ducks, crane and water birds.

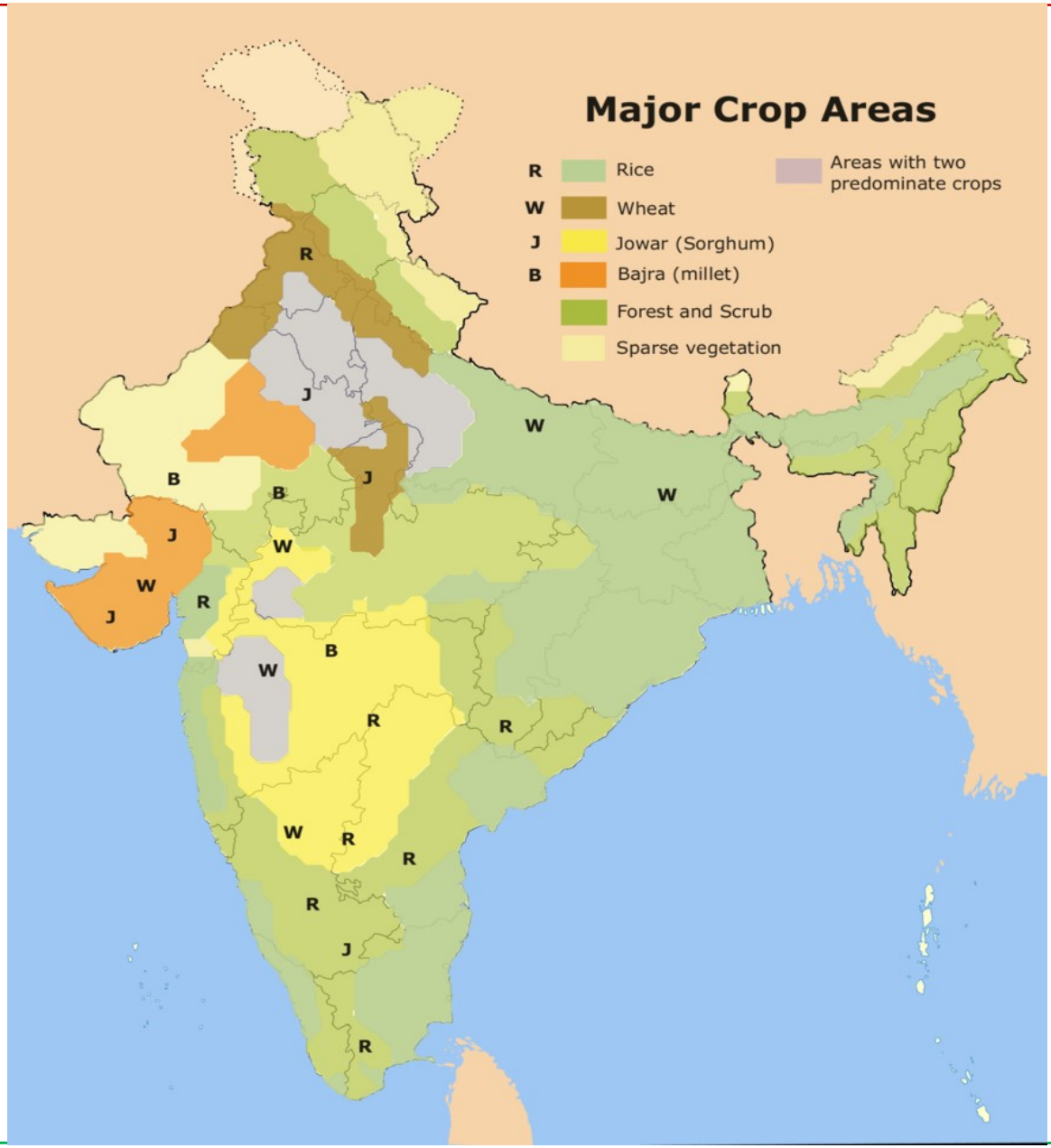
Food Resources

- Average Minimum dietary requirement about 1800 cal/person per day
- Increasing population results in less per capita food availability
- Relation between population growth and growth in food production becomes important
- Food production in most developing countries is less than their population growth rates

Sources of food

- About 700 million dependent on agriculture in India
- From 1951 to 1997: gross irrigated area (GIA) (includes double cropping) expanded four fold, from 23 M Ha to 90 M Ha
- India has the largest irrigated area among all the countries in the world among all the countries in the world

Major crop areas



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Maize or Corn Crop

Maize or Corn

Rice Crop

Photo by **cmmacc** form **PxHere**

Jowar Crop

Photo by form **PxHere**

Bajra Crop

Ragi Crop

https://www.flickr.com/photos/chinogypsie/3844113097

Bean Plant

Chickpea Plant

Pea Plant

Pigeonpea Plant

Mungbean Plant

Healthy Diet

- Consuming a healthy diet throughout the life-course helps to prevent malnutrition in all its forms as well as a range of noncommunicable diseases (NCDs) and conditions. However, increased production of processed foods, rapid urbanization and changing lifestyles have led to a shift in dietary patterns.

A healthy diet includes the following:

- Fruit, vegetables, legumes (e.g. lentils and beans), nuts and whole grains (e.g. unprocessed maize, millet, oats, wheat and brown rice).
- Person of healthy body weight consuming about 2000 calories per day
- At least 400 g of fruit and vegetables per day
- Less than 10% of total energy intake from free sugars

Healthy Diet

- Less than 30% of total energy intake from fats
- Unsaturated fats (found in fish, avocado and nuts, and in sunflower, soybean, canola and olive oils) are preferable to saturated fats (found in fatty meat, butter, palm and coconut oil, cream, cheese, ghee and lard)
- It is suggested that the intake of saturated fats be reduced to less than 10% of total energy intake and trans-fats to less than 1% of total energy intake.
- Less than 5 g of salt (equivalent to about one teaspoon) per day (8). Salt should be iodized.

Recommended daily doses of Vitamins

Vitamin	What It Does	Where It Is Found	Daily dose
Biotin	Energy storage Protein, carbohydrate fat metabolism	Avocados Cauliflower Eggs, Fruits , Liver Whole grains	30 mcg
Choline	Brain development Cell signaling Lipid (fat) transport and metabolism Liver function Muscle movement Nerve function	Beans and peas Egg yolks Fish, Liver Milk, Nuts Soy foods Vegetables (broccoli, cauliflower, spinach)	550 mg
Folate/Folic Acid	Prevention of birth defects Protein metabolism Red blood cell formation	Asparagus Avocados Beans and peas Green leafy vegetables Oranges	400 mcg

Recommended daily doses of Vitamins

Vitamin	What It Does	Where It Is Found	Daily dose
Niacin	Cholesterol production Conversion of food into energy Digestion Nervous system function	Beans Beef ,Nuts Pork, Poultry Seafood Whole grains	16 mg
Pantothenic Acid	Conversion of food into energy Fat metabolism Hormone production Nervous system function Red blood cell formation	Avocados Beans and peas, Broccoli Eggs, Milk, Mushrooms Poultry, Seafood Sweet potatoes Whole grains	5 mg
Riboflavin	Conversion of food into energy Growth and development Red blood cell formation	Eggs, Meat Milk,Mushrooms Poultry Seafood (e.g., oysters) Spinach	1.3 mg

Recommended daily doses of Vitamins

Vitamin	What It Does	Where It Is Found	Daily dose
Thiamin	Conversion of food into energy Nervous system function	Beans and peas, Nuts , Pork, Sunflower seeds Whole grains	1.2 mg
Vitamin A	Growth and development Immune function Red blood cell formation Reproduction Skin and bone formation Vision	Cantaloupe, Carrots Dairy products, Eggs Fortified cereals Green leafy vegetables(e.g., spinach and broccoli),Red peppers Sweet potatoes	900 mcg
Vitamin B6	Immune function Nervous system function Protein, carbohydrate, and fat metabolism Red blood cell formation	Chickpeas Fruits (other than citrus) Potatoes Salmon Tuna	1.7 mg

Recommended daily doses of Vitamins

Vitamin	What It Does	Where It Is Found	Daily dose
Vitamin B12	Conversion of food into Energy, Nervous system function Red blood cell formation	Dairy products , Eggs Fortified cereals, Meat Poultry ,Seafood (e.g., clams, trout, salmon, haddock, tuna)	2.4 mcg
Vitamin C	Antioxidant Collagen and connective tissue formation Immune function Wound healing	Fruit (e.g., cantaloupe, citrus fruits, kiwifruit, and strawberries) Vegetables (e.g., broccoli, Brussels sprouts, peppers, and tomatoes)	90 mg
Vitamin D	Blood pressure regulation, Bone growth Calcium balance Hormone production Nervous system function	Eggs , Fish (e.g., herring, mackerel, salmon, trout, and tuna) Fish oil and cod liver oil Mushrooms, Pork	20 mcg

Recommended daily doses of Vitamins

Vitamin	What It Does	Where It Is Found	Daily dose
Vitamin E	Antioxidant Formation of blood vessels Immune function	Fortified cereals and juices Green vegetables (e.g., spinach and broccoli) Nuts and seeds Peanuts and peanut butter Vegetable oils	15 mg
Vitamin K	Blood clotting Strong bones	Green vegetables (e.g., broccoli, kale, spinach, turnip greens, collard greens, Swiss chard, mustard greens)	120 mcg

Recommended daily doses of Minerals

Mineral	What It Does	Where It Is Found	Daily dose
Calcium	Blood clotting Bone and teeth formation Constriction and relaxation of blood vessels Hormone secretion Muscle contraction Nervous system function	Canned seafood with bones (e.g., salmon and sardines) Dairy products Green vegetables (e.g., kale, broccoli, and collard greens) Tofu	1,300 mg
Chloride	Acid-base balance Conversion of food into energy Digestion Fluid balance Nervous system function	Olives Rye Salt substitutes Seaweeds (e.g., dulse and kelp) Table salt and sea salt Vegetables (e.g., celery, lettuce, and tomatoes)	2,300 mg

Recommended daily doses of Minerals

Mineral	What It Does	Where It Is Found	Daily dose
Chromium	Insulin function Protein, carbohydrate, and fat metabolism	Broccoli, Fruits (e.g., apples and bananas) Meat , Spices (e.g., garlic and basil), Turkey Whole grains	35 mcg
Copper	Antioxidant Bone formation Collagen and connective tissue formation Energy production Iron metabolism Nervous system function	Chocolate and cocoa Crustaceans and shellfish Lentils Nuts and seeds Organ meats (e.g., liver) Whole grains	0.9 mg

Recommended daily doses of Minerals

Mineral	What It Does	Where It Is Found	Daily dose
Iodine	Growth and development Metabolism Reproduction Thyroid hormone production	Breads and cereals Dairy products Iodized salt Potatoes Seafood Seaweed, Turkey	150 mcg
Iron	Energy production Growth and development Immune function Red blood cell formation Reproduction Wound healing	Beans, Eggs, Fruits (e.g., raisins and prunes) Green vegetables (e.g., spinach, kale, broccoli) Meat, Nuts, Organ meats (e.g., liver), Peas, Poultry, Seeds, Seafood (e.g., tuna, sardines, haddock, shrimp, and oysters) Soy products (e.g., tofu) Whole grain	18 mg

Recommended daily doses of Minerals

Mineral	What It Does	Where It Is Found	Daily dose
Magnesium	Blood pressure and Blood sugar regulation Bone formation Immune function Muscle contraction Nervous system function Normal heart rhythm Protein formation	Avocados Beans and peas Dairy products Fruits (e.g., bananas and raisins) Green leafy vegetables (e.g.,spinach) Nuts and pumpkin seeds Potatoes, Whole grains	420 mg
Manganese	Carbohydrate and protein metabolism Cartilage and bone formation Wound healing	Beans, Nuts Pineapple, Spinach Sweet potato Whole grains	2.3 mg
Molybdenum	Enzyme production	Beans and peas Nuts , Whole grains	45 mcg

Recommended daily doses of Minerals

Mineral	What It Does	Where It Is Found	Daily dose
Phosphorus	Acid-base balance Bone formation Energy production and storage Hormone activation	Beans and peas Dairy products Meat Nuts and seeds Poultry Seafood Whole grain, enriched, and	1,250 mg
Potassium	Blood pressure regulation, Carbohydrate metabolism, Fluid balance Heart function Muscle contraction Nervous system function	Beans Dairy products, Fruits (e.g., bananas, dried apricots, and stewed prunes) Seafood (e.g., clams and salmon) Vegetables (e.g., potatoes, sweet potatoes, beet greens, and spinach)	4,700 mg

Recommended daily doses of Minerals

Mineral	What It Does	Where It Is Found	Daily dose
Selenium	Antioxidant Immune function Reproduction Thyroid function	Eggs Enriched pasta and rice Meat, Nuts (e.g., Brazil nuts) and seeds Poultry, Seafood Whole grains	55 mcg
Zinc	Growth and development Immune function Nervous system function Protein formation Reproduction Taste and smell Wound healing	Beans and peas Beef Dairy products Fortified cereals Nuts Poultry Shellfish Whole grains	11 mg

Unsustainable Agriculture

- Modern agricultural pattern pollutes environment with excessive use of pesticide and fertilizer
- Monoculture (single crop) enhances the risk of production
- Reducing/ stagnating crop yields: fatigue of intensive agriculture and climate change
- Incremental use of inorganic fertilizer and pesticide
- impacts of climate change and global warming on agriculture

Overexploitation of Resource

- Reducing availability of natural resources for agriculture
- Need for increased resources: land, water, fertilizers, capital
- Soils are being exploited faster than they can recuperate
- Excessive conversion of forests, grasslands and wetlands to agricultural land
- Fish resource, both marine and inland, show evidence of exhaustion

Malnutrition

- Around the world, there are two types of food problems are found:

1. Malnutrition, 2. Undernourishment

- Malnutrition result from the absence of minimum amount of proteins, carbohydrates, lipids, vitamins and other essential nutrients required for proper health and growth. It may cause productivity losses, nutrition related illnesses and problems of health and growth especially in children. This problem is common in poor countries and include problems caused by the deficiency of nutrients like iodine, iron and vitamins.

Malnutrition

- The problem of undernourishment occurs when the body is not been given enough food or enough calories as required to support its need. Due to this, the body begins to break down its own stored proteins and fats which reduces mental and physical efficiency as well as affects adversely the body immune system.
- In the developing countries, this problem is common and has become a cause for diseases like anaemia and even death.
- Every year 40 million people die of malnutrition and undernourishment. According to WHO, more than 3 billion people in the world are malnourished.

Effects of Modern Agriculture

- The widespread use of chemicals in agriculture
- fertilizers
- pesticides
- insecticides
- These chemicals have multiplied the hazards to which human beings are exposed. These chemicals spread through the environment and pose a threat to all animals. Fertilizers are materials that are added to soil to restore and enhance soil fertility to improve the quality and quantity of plant growth.

Effects of Modern Agriculture

- Fertilizers may be natural or artificial (synthetic). Natural fertilizers are further divided into Organic and inorganic fertilizers.
- Inorganic fertilizers
- Gypsum,
- Crushed limestone and sulphur
- rock phosphate
- organic fertilizers are manure, animal excreta, plant wastes and humus

Effects of Modern Agriculture

- Excess fertilizers that are not taken-up by plants, leech into sub-soil water sources and contaminate them. They are non-biodegradable and thus accumulate to reach objectionable levels as they pass through different levels of the food chain.

- The main problem with fertilizer use is the contamination of water with nitrates, phosphates and potassium.

Effects of Modern Agriculture

- Leaching of nitrate from agricultural fields can increase groundwater concentrations to unacceptable levels for drinking water supply
- High nitrate levels in drinking water are dangerous to human health
- Phosphorus cannot be washed out of soil but can be washed into surface waters together with the soil that is being eroded. Phosphorus is not dangerous. However, it stimulates the excess growth of algae and this process is called "eutrophication". The algae eventually die and decompose resulting in depletion of dissolved oxygen thereby killing fish.

Effects of Modern Agriculture

- Agriculture increases carbon dioxide levels making it one of the main sources of carbon dioxide emissions for decades. This in-turn aggravates the problem of global warming and consequent sea level rise.
- Animal waste from farms contains harmful pathogens known to cause disease and infection. By getting into soil and water systems they create irreversible damage to land and pose health risks towards humans. These problems lead both directly and indirectly to these health risks, and may causes disorders such as hepatitis and meningitis.

Effects of Modern Agriculture

- Fertilizers also cause several environmental problems. They contain harmful elements such as nitrogen and phosphates, both of which negatively affect air and water quality. Fertilizer use causes the release of ammonia, nitrogen runoff and eutrophication, all of which have negative effects on the environment.
- Impacts also include increased water or wind erosion, depleted groundwater supplies in irrigated areas.

Effects of Modern Agriculture

- Modern agriculture converts a large part of the earth's land surface to monoculture. As a result, the genetic and ecological diversity of the planet erodes. The conversion of diverse natural ecosystems to new agricultural lands and the narrowing of the genetic diversity of crops contribute to this erosion.
- In addition to adding pollutants to water, soil and air, modern agriculture practices can cause soil disturbance by using heavy machines and tilling equipment. This, in turn, creates soil erosion and degrades the quality of surrounding farmland.

Effects of Modern Agriculture

- A number of "ecological diseases" have been associated with the growth of food production.
- Diseases of the ecotope, which include erosion, loss of soil fertility, depletion of nutrient reserves, salinization and alkalinization, pollution of water systems, loss of fertile croplands to urban development.
- Diseases of the biocoenosis, which include loss of crops, wild plants, and animal genetic resources, elimination of natural enemies, pest resurgence and genetic resistance to pesticides, chemical contamination, and destruction of natural control mechanisms.

Problems due to the use of Pesticides

- Pesticides do not degrade easily and get circulated in food chains.
- This process is called biological magnification. It is responsible for mutation. It also destroys wildlife.
- Pesticides kill many species that are not supposed to be eliminated.
- Pesticides contaminate our food and also affect our health.
- Pesticides are also responsible in developing gene resistant pest species.
- Integrated Pest Management (IPM) is a modern approach to control population of pests by using many techniques such as
- Natural enemies of pests
- Mixed cropping

Environmental Effects of Overgrazing

- Soil erosion due to overgrazing – The top layer of the soil cover gets exposed due to overgrazing, which is carried away by wind and rain.
- Loss of species – Overgrazing destroys many valuable species of plants.
- Land degradation – Overgrazing by cattle causes land degradation as their feet loosens the soil.
- Growth of undesirable plants – Overgrazing promotes the growth of unwanted plant species. Such species pose a threat to our original breeds.

Water Logging

- Water logging refers to the saturated condition of soil, where the water table reaches close to the surface and plants are unable to get air for respiration. This results in low crop production. Water logging takes place when the soil is saturated with water, such as near dams or excessively irrigated regions.
- Water logging can be checked using the subsurface drainage technology and by growing trees like eucalyptus which absorb the moisture from the soil.

Salinity Problems

- Deposition of salts make the soil unsuitable for crops, this process is called salinisation. Nearly seven million hectares of land is badly affected by salinity. Excessive irrigation causes salinity problems.
- Most part of the land is irrigated through canals and ground water which has high content of dissolved salts. Due to evaporation, the salt gets deposited in the soil causing salinisation. It creates the following problems:
- Reduction of growth in crops
- Increase in soil infertility
- Reduction in crop production
- Hazardous to wildlife

Cropland Management

- There is thus an urgent need for integrated cropland management and preservation of environment
- Water management (irrigation, drainage)
- Rice Management
- Agronomy
- Nutrient management
- Tillage/residue management

Cropland Management

- Agro-forestry
- land-use change
- Perceptions from Field
- Climate parameters
- Seed variety
- Irrigation techniques
- Pest control
- Sustainable agriculture