

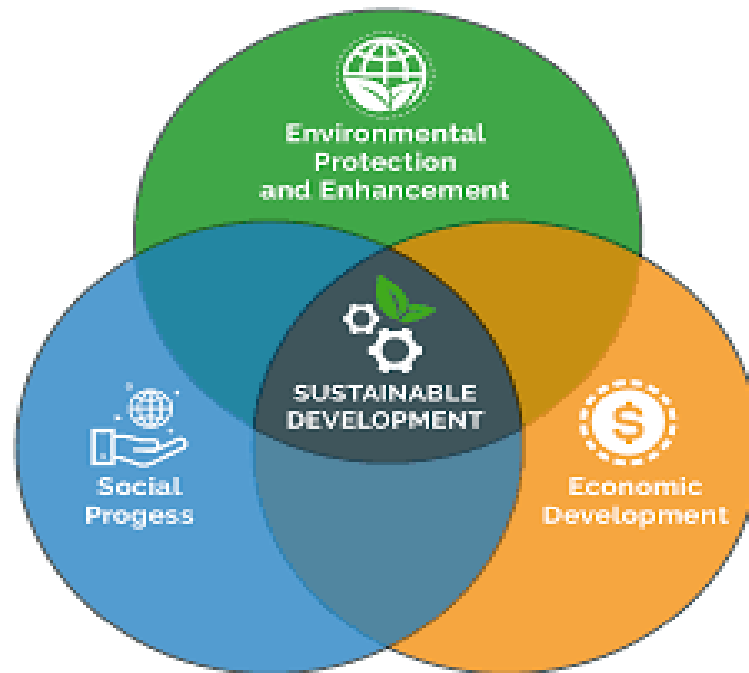
## **Interaction between Earth, Man and Environment-**

- ✓ Earth-human-environment system involves a reciprocal relationship where each component influences and is influenced by the others.
- ✓ Human Impact on the Environment:
  - ❖ Resource Consumption: Humans extract and use natural resources such as water, minerals, fossil fuels, and forests to meet their needs. Overconsumption can lead to resource depletion and environmental degradation.
  - ❖ Pollution: Industrial activities, agriculture, and urbanization can result in various forms of pollution, including air pollution, water pollution, soil contamination, and noise pollution.
  - ❖ Land Use Change: Deforestation, urban sprawl, and agricultural expansion alter the landscape, affecting ecosystems and biodiversity.
- ✓ Environmental Impact on Humans:
  - ❖ Climate Change: Changes in the Earth's climate, driven by human activities such as burning fossil fuels and deforestation, have widespread impacts on weather patterns, sea levels, and ecosystems. These changes can affect human health, agriculture, and infrastructure.
  - ❖ Natural Disasters: Earthquakes, hurricanes, floods, and other natural disasters can have devastating effects on human communities, highlighting the vulnerability of human societies to environmental forces.
- ✓ Human Adaptation to Environmental Changes:
  - ❖ Technological Innovation: Humans develop technologies to adapt to environmental challenges, such as creating resilient infrastructure, developing drought-resistant crops, and implementing renewable energy solutions.
  - ❖ Policy and Governance: Governments and international organizations implement policies to manage environmental resources, reduce pollution, and mitigate the impacts of climate change.
- ✓ Ecosystem Services and Human Well-Being:
  - ❖ Biodiversity: Healthy ecosystems provide essential services such as clean air and water, pollination of crops, and regulation of climate. Biodiversity loss can negatively impact these services and human well-being.
  - ❖ Cultural and Recreational Values: Humans derive cultural, spiritual, and recreational benefits from the environment, influencing their overall quality of life.

✓ Sustainable Development:

- ❖ **Balancing Needs:** Achieving sustainable development involves finding a balance between meeting current human needs and preserving the environment for future generations. This requires considering social, economic, and environmental factors in decision-making.

***Sustainable development*** is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.



- ✓ This most widely accepted definition of Sustainable Development was given by the ***Brundtland Commission*** in its report *Our Common Future* (1987).
- ✓ Sustainable development (SD) calls for concerted efforts towards building an inclusive, sustainable and resilient future for people and planet.
- ✓ Three core elements of sustainable development are economic growth, social inclusion and environmental protection.
- ✓ Sustainable economic growth, achieving sustainable livelihood, living in harmony with nature and appropriate technology are important for sustainable development.
- ✓ Environmental Sustainability: It prevents nature from being used as an inexhaustible source of resources and ensures its protection and rational use. Aspects such as environmental conservation, investment in renewable energy, saving water, supporting sustainable mobility, and innovation in sustainable construction and architecture, contribute to achieving environmental sustainability on several fronts.
- ✓ Social Sustainability: It can foster gender equality, development of people, communities and cultures to help achieve a reasonable and fairly-distributed quality of life, healthcare and education across the Globe.

- ✓ Economic Sustainability: Focuses on equal economic growth that generates wealth for all, without harming the environment. Investment and equal distribution of economic resources. Eradicating poverty in all its forms and dimensions.
- ✓ Global Initiatives on Sustainable Development
  1. The Stockholm Conference, 1972: It was the first step towards putting environmental concerns on the global agenda.
  2. It resulted in the Stockholm Declaration which contained principles and an Action Plan containing recommendations for environmental policy.
  3. UNEP was set up in 1972 to serve as a catalyst in developing and coordinating an environmental focus in the programmes of other organisations.
  4. The Earth Summit, 1992: This was a direct consequence of the Brundtland Commission's Report. It was held in Rio de Janeiro. The results of the Conference were the following documents:
    - i) The Framework Convention on Climate Change (UNFCCC)
    - ii) The Convention on Biological Diversity
    - iii) The Statement on Forest Principles
    - iv) The Rio Declaration
    - v) Agenda 21
  5. Rio +10, 2002: A 10-year assessment of the Rio outcomes (Rio +10) took the shape of the World Summit on Sustainable Development (WSSD) held in Johannesburg.

### **Sustainable Development Goals:**

- SDGs agenda accepted by all UN members in 2012 at Rio De Janeiro Council Meet.
- Aim: Promote a healthy and developed future for the planet and its people.
- 2015: SDGs officially implemented.
- Preceded by a successful fifteen-year development plan known as the Millennium Development Goals (MDGs).
- Rio De Janeiro Council Meet (2012): UN members collectively accepted the SDGs agenda. Highlights the global commitment to addressing environmental, social, and economic challenges.
- Purpose of SDGs: Promote sustainability in development practices. Address global issues affecting the well-being of both the planet and its inhabitants.
- **Millennium Development Goals (MDGs):**
  - Predecessor to SDGs, spanning from 2000 to 2015.
  - Focus on eradicating poverty, hunger, and improving health, education, and gender equality.
  - Achievements of MDGs: Successful outcomes in various areas, laying the groundwork for the SDGs. Contributed to progress in reducing poverty and improving living conditions globally.
- SDGs Comprehensive framework with **17 goals and 169 targets**.

- Goals cover diverse areas such as poverty, health, education, climate action, and more.
- Global Collaboration: Emphasizes the importance of international cooperation. All UN member states committed to working towards achieving the SDGs.
- SDGs are part of the 2030 Agenda for Sustainable Development. A blueprint for global action over the next decade and a half.

The **17 goals under the Sustainable Development Goals** are as mentioned below:

- 1) End poverty in all its forms everywhere
- 2) End hunger, achieve food security and improved nutrition and promote sustainable agriculture
- 3) Ensure healthy lives and promote well-being for all at all stages
- 4) Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all
- 5) Achieve gender equality and empower all women and girls
- 6) Ensure availability and sustainable management of water and sanitation for all
- 7) Ensure access to affordable, reliable, sustainable and modern energy for all
- 8) Promote sustained, inclusive and sustainable economic growth, full and productive employment and decent work for all
- 9) Built resilient infrastructure, promote inclusive and sustainable industrialisation and foster innovation.
- 10) Reduce inequalities within and among countries.
- 11) Make cities and human settlements inclusive, safe, resilient and sustainable.
- 12) Ensure sustainable consumption and production pattern.
- 13) Take urgent actions to combat climate change and its impact.
- 14) Conserve and sustainably use the oceans, seas and marine resources.
- 15) Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably managed forests, combat desertification and halt and reverse land degradation and halt biodiversity loss.
- 16) Promote peaceful and inclusive societies for sustainable development, provide access to justice for all and build effective, accountable and inclusive institutions at all levels.
- 17) Strengthen the means of implementation and revitalise the global partnership for sustainable development.

### **Millennium Development Goals**

The United Nations in September 2000 made all its members follow a Millennium Development goal that had a series of eight time-bound targets that were supposed to be attained within a time period of fifteen years. (up to 2015)

The **8 targets** under the Millennium Development Goal are as mentioned below:

1. To eradicate extreme poverty and hunger
2. To achieve universal primary education
3. To promote gender equality and empower women
4. To reduce child mortality
5. To improve maternal health
6. To combat HIV/AIDS, malaria and other diseases
7. To ensure environmental sustainability
8. To develop a global partnership for development

## **Biogeographic Provinces of World:**

- The world is divided into eight (8) biogeographic realms
- Antarctic, Nearctic, Neotropical, Afrotropical, Palearctic, Indomalayan, Australasian, Oceanian.
- Biogeography, the study of animal and plant distributions (and known individually as zoogeography and phytogeography, respectively)

### ▪ **Nearctic realm**

- The Nearctic realm covers most of North America, including Greenland, Canada, USA and the highlands of Mexico.
- The parts of North America that are not in the Nearctic realm include most of coastal Mexico, southern Mexico, southern and coastal central Florida, and the Caribbean islands. Together with South America, these regions are part of the Neotropical realm.



### ▪ **Neotropical realm**

- It includes the tropical terrestrial ecoregions of the Americas and the entire South American temperate zone.



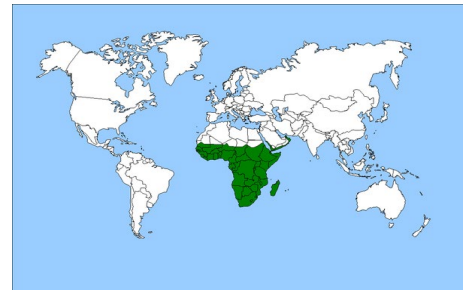
### ▪ **Palearctic realm**

- Palearctic is the *largest* of the eight biogeographic realms of the Earth.
- It stretches across all of Eurasia north of the foothills of the Himalayas, and North Africa.
- The realm consists of several bioregions: the Euro-Siberian region; the Mediterranean Basin; the Sahara and Arabian Deserts; and Western, Central and East Asia.



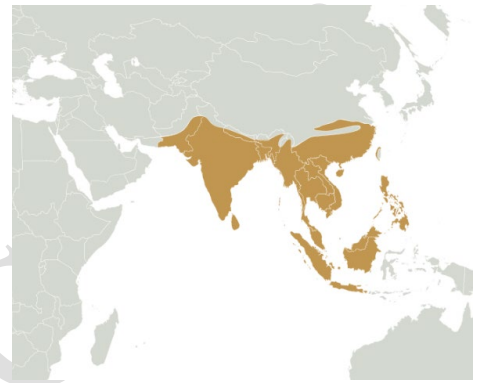
▪ **Afrotropical realm**

- It includes Sub-Saharan Africa, the southern Arabian Peninsula, the island of Madagascar, and the islands of the western Indian Ocean.
- It was formerly known as the Ethiopian Zone or Ethiopian Region.



▪ **Indomalayan realm**

- It extends across most of South and Southeast Asia and into the southern parts of East Asia.
- Also called the ***Oriental realm*** by biogeographers, Indomalaya spreads all over the Indian subcontinent and Southeast Asia to lowland southern China, and through Indonesia as far as Sumatra, Java, Bali, and Borneo, east of which lies the Wallace line, the realm boundary named after Alfred Russel Wallace which separates Indomalaya from Australasia.
- Indomalaya also includes the Philippines, lowland Taiwan, and Japan's Ryukyu Islands.
- Most of Indomalaya was originally covered by forest, and includes tropical and subtropical moist broadleaf forests, with tropical and subtropical dry broadleaf forests predominant in much of **India** and parts of Southeast Asia.



▪ **Oceanian realm**

- The Oceanian realm is one of the World Wildlife Fund (WWF) biogeographic realms, and is unique in not including any continental land mass.
- It has the ***smallest land area*** of any of the realms. This realm includes the islands of the Pacific Ocean in Micronesia, the Fijian Islands, the Hawaiian islands, and Polynesia.



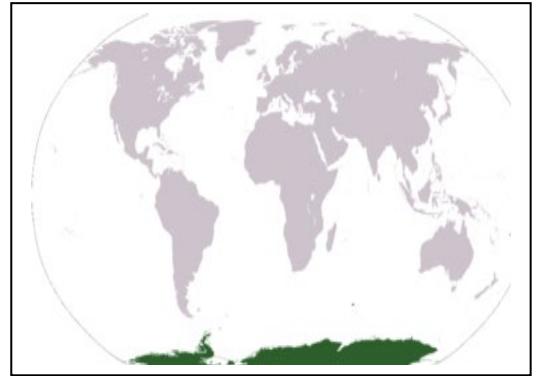
▪ **Australasian realm**

- The realm includes Australia, New Zealand and the island of New Guinea



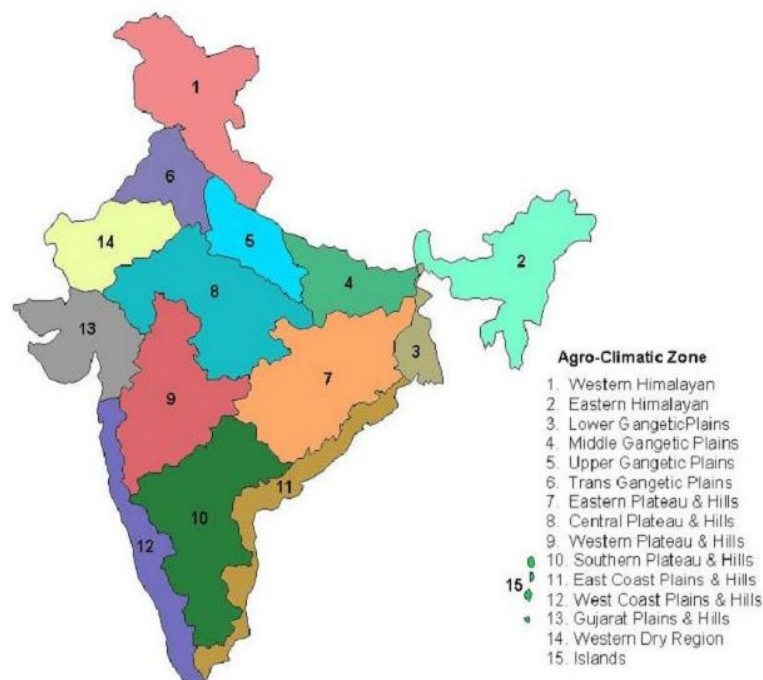
## Antarctic realm

- The ecosystem includes Antarctica and several island groups in the southern Atlantic and Indian oceans.
- The continent of Antarctica is so cold that it has supported only 2 vascular plants for millions of years, and its flora presently consists of around 250 lichens, 100 mosses, 25-30 liverworts, and around 700 terrestrial and aquatic algal species



## Agro – Climatic Zones of India:

- An “Agro-climatic zone” is a land unit in terms of major climates, suitable for a certain range of crops and cultivars.
- The planning aims at scientific management of regional resources to meet the food, fiber, fodder and fuel wood without adversely affecting the status of natural resources and environment. Crop yield is (FAO, 1983).
- Agro-climatic conditions mainly refer to soil types, rainfall, temperature and water availability which influence the type of vegetations.
- An agro-ecological zone is the land unit carved out of agro-climatic zone superimposed on landform which acts as modifier to climate and length of growing period.
- With the 328 million hectares of the geographical area the country presents a large number of complex agro-climatic situations.
- The geographical area of India is divided into **15 agro-climatic regions**. These are further divided into more homogeneous 72 sub-zones.



## 1. Western Himalayan Region

- It includes Jammu and Kashmir, Himachal Pradesh and Kumaun-Garhwal areas of Uttarakhand.
- It shows great variation in relief.
- The summer season is mild (July average temperature 5°C-30°C) but the winter season experiences severe cold conditions (January temperature 0°C to -4°C).
- The amount of average annual rainfall is 150 cm. Zonal arrangement in vegetation is found with varying heights along the hill slopes.
- Valleys and duns have thick layers of alluvium while hill slopes have thin brown hilly soils.
- The region has perennial streams due to high rainfall and snow-covered mountain peaks of Ganga, Yamuna, Jhelum, Chenab, Satluj and Beas.
- They provide irrigation water to canals and cheap hydel power for agriculture and industries. Maize, wheat, potato, barley are important crops.
- Temperate fruits like apples and pears are produced in some parts of Jammu and Kashmir and Himachal Pradesh.

## 2. Eastern Himalayan Region

- The Eastern Himalayan region consists of Sikkim, Darjeeling area (West Bengal), Arunachal Pradesh, Assam hills, Nagaland, Meghalaya, Manipur, Mizoram and Tripura.
- It is characterised by rugged topography, thick forest cover and sub-humid climate (rainfall over 200 cm; temperature July 25°C-33°C, January 11°C-24°C).
- The soil is brownish, thick layered and less fertile. Shifting cultivation (Jhum) is practised in nearly 1/3 of the cultivated area and food crops are raised mainly for sustenance.
- Rice, potato, maize, tea and fruits (orange, pineapple, lime, litchi etc.) are the main crops.

## 3. Lower Gangetic Plains Region

- This region spreads over eastern Bihar, West Bengal and Assam valley.
- Here the average amount of annual rainfall lies between 100 cm-200 cm. Temperature for July month varies from 26°C-41°C and for January month 9°C-24°C.
- The region has adequate storage of groundwater with a high water table. Wells and canals are the main sources of irrigation.
- The problem of waterlogging and marshy lands is acute in some parts of the region.
- Rice is the main crop that at times yields three successive crops (Aman, Aus and Boro) in a year. Jute, maize, potato, and pulses are other important crops.
- Planning strategies include improvement in rice farming, horticulture (banana, mango and citrus fruits), pisciculture, poultry, livestock, forage production and seed supply.



#### **4. Middle Gangetic Plains Region**

- It incorporates eastern Uttar Pradesh and Bihar (except the Chotanagpur plateau). It is a fertile alluvial plain drained by the Ganga River and its tributaries.
- The average temperature of July month varies from 26°C- 41°C and that of January month 9°C-24°C.
- The amount of annual rainfall lies between 100 cm and 200 cm.
- The region has vast potential of groundwater and surface runoff in the form of perennial rivers which is utilised for irrigation through tube wells, canals and wells.
- Rice, maize, millets in Kharif season; wheat, gram, barley, peas, mustard and potato in Rabi season are important crops.

#### **5. Upper Gangetic Plains Region**

- This region encompasses the central and western parts of Uttar Pradesh.
- The climate is sub-humid continental with July month's temperature between 26°- 41°C, January month's temperature between 7° - 23°C and average annual rainfall between 75 cm- 150 cm.
- The soil is sandy loam. It has 131 per cent irrigation intensity and 144 per cent cropping intensity.
- Canal, tube wells and wells are the main source of irrigation.
- This is an intensive agricultural region where wheat, rice, sugarcane, millets, maize, gram, barley, oilseeds, pulses and cotton are the main crops.

#### **6. Trans-Gangetic Plains Region**

- The Trans Ganga Plain consists of Punjab, Haryana, Delhi, Chandigarh and Ganganagar district of Rajasthan.
- The climate has semi-arid characteristics with July month's temperature between 26°C and 42°C, January temperature ranging from 7°C to 22°C and average annual rainfall between 70 cm and 125 cm.
- Private tube wells and canals provide principal means of irrigation.
- Important crops include wheat, sugarcane, cotton, rice, gram, maize, millets, pulses and oilseeds etc.

#### **7. Eastern Plateau and Hills Region**

- It comprises the Chotanagpur plateau, Rajmahal Hills, Chhattisgarh plains and Dandakaranya.
- The region enjoys 26°C-34°C of temperature in July, 10°C-27° C in January and 80 cm-150 cm of annual rainfall.

- Soils are red and yellow with occasional patches of laterites and alluviums. The region is deficient in water resources due to plateau structure and non-perennial streams.
- Rainfed agriculture is practised growing crops like rice, millets, maize, oilseeds, ragi, gram and potato.

### **8. Central Plateau and Hills Region**

- This region spreads over Bundelkhand, Baghelkhand, Bhandar plateau, Malwa plateau and Vindhya hills.
- The climate is semi-arid in the western part to sub-humid in the eastern part with temperature in July month 26°C-40°C, in January month 7°C-24°C and average annual rainfall from 50 cm- 100 cm.
- Soils are mixed red, yellow and black growing crops like millets, gram, barley, wheat, cotton, sunflower, etc. The region has a dearth of water resources.

### **9. Western Plateau and Hills Region**

- This comprises the southern part of the Malwa plateau and Deccan plateau (Maharashtra).
- This is a region of the respective soil with July temperature between 24°C-41 °C, January temperature between 6°C- 23°C and average annual rainfall of 25 cm-75 cm.
- Net sown areas are 65 per cent and forests occupy only 11 per cent. Only 12.4 per cent of the area is irrigated.
- Jowar, cotton, sugarcane, rice, bajra, wheat, gram, pulses, potato, groundnut and oilseeds are the principal crops.
- The area is known for its oranges, grapes and bananas.

### **10. Southern Plateau and Hills Region**

- It incorporates southern Maharashtra, Karnataka, western Andhra Pradesh and northern Tamil Nadu.
- The temperature of July month lies between 26°C to 42°C, that of January month between 13°C-21°C with annual rainfall between 50 cm-100 cm.
- The climate is semi-arid with only 50 per cent of the area cultivated, 81 percent of dryland farming, and low cropping intensity of 111 per cent.
- Low-value cereals and minor millets predominate. Coffee, tea, cardamom and spices are grown along the hilly slopes of the Karnataka plateau.

### **11. East Coast Plains and Hills Region**

- This region includes the Coromandel and Northern Circar – the important Coastal plains of India.

- Here the climate is sub-humid maritime with May and January's temperatures ranging from 26°C-32°C and 20°C-29°C respectively and annual rainfall of 75 cm-150 cm.
- The soils are alluvial, loam and clay facing the menacing problem of alkalinity. The region accounts for 20.33 per cent of rice and 17.05 per cent of groundnut production of the country.
- Main crops include rice, jute, tobacco, sugarcane, maize, millets, groundnut and oilseeds.

## 12. West Coast Plains and Ghats Region

- This region extends over the Malabar and Konkan coasts and the Sahyadris and is covered by laterite and coastal alluvials.
- This is a humid region with annual rainfall above 200 cm and average temperatures of 26°C-32°C in July and 19°C-28°C in January.
- Rice, coconut, oilseeds, sugarcane, millets, pulses and cotton are the main crops.
- The region is also famous for plantation crops and spices which are raised along the hill slopes of the Ghats. Zone

## 13. Gujarat Plains and Hills Region

- This region includes Kathiawar and fertile valleys of the Mahi and Sabarmati rivers.
- It is an arid and semi-arid region with average annual rainfall between 50 cm-100 cm, and monthly temperature between 26°C-42°C in July and 13°C-29°C in January.
- Soils are regur in the plateau region, alluvium in the coastal plains and red and yellow soils in Jamnagar Groundnut, cotton, rice, millets, oilseeds, wheat and tobacco are the main crops.
- It is an important oilseed producing region.

## 14. Western Dry Region

- It comprises western Rajasthan west of the Aravallis.
- It is characterised by hot sandy desert, erratic rainfall (annual average less than 25 cm), high evaporation, contrasting temperature (June 28°C- 45°C, and January 5°C-22°C), absence of perennial rivers, and scanty vegetation.
- Groundwater is very deep and often brackish.
- Famine and drought are common features.
- The land-man ratio is high.
- Forest area is only 1.2 per cent.
- Land under pastures is also low at 4.3 per cent.
- Cultivable waste and fallow lands account for nearly 42 per cent of the geographical area.

- Net irrigated area is only 6.3 percent of the net sown area which is 44.4 percent of the geographical area.
- Bajra, jowar, and moth are the main crops of Kharif and wheat and gram of Rabi. Livestock contributes greatly to desert ecology.

### **15. The Islands Region**

- The island region includes Andaman-Nicobar and Lakshadweep which have typically equatorial climates.
- The annual rainfall is less than 300 cm, the mean July and January temperatures of Port Blair being 30°C and 25°C respectively.
- The soils vary from sandy along the coast to clayey loam in valleys and lower slopes.
- The main crops are rice, maize, millets, pulses, areca nut, turmeric and cassava. Nearly half of the area is under coconut.
- The area is covered with thick forests and agriculture is in a backward stage.