CHAPTER - II

HISTORICAL DEVELOPMENT OF GEOGRAPHIC KNOWLEDGE AND INFORMATION WITH SPECIAL REFERENCE TO INDIA

1. EARLY CIVILIZATIONS

When the human being came on earth, he found himself a perfect stranger on it. Through his environment which was directly connected with his struggle for existence, he started gaining many experiences through conscious or unconscious observations. It was these experiences which led him to a settled life, instead of nomadic one. With this new lifestyle sprang up 'Civilization'. One after another many civilizations came into being, and with these emerged new ideas, new beliefs, struggle for existence, and therefore conflicts and critical reflections. He was able to notice the physical processes around him, including light, warmth and life the sun brings in, the movement of sun with changing seasons, gravitational pull of the earth, atmospheric changes, organic life of the surface of the earth, seas etc. His interest in these physical features and processes gradually increased. Then the time came when human beings started paying serious and thoughtful consideration to the behaviour and cause of natural phenomena. It was this interest in the physical phenomena which laid the foundation of 'Geography'.

51
Geography as a subject has undergone many changes from time to time, because many civilizations, as and when they developed, made their contribution according to their intellectual capacities.

As far as birth of the first civilization of the world is concerned, most of the scholars claim that it was in Asia and Africa, where earliest civilizations came into being. The historians and archaeologists have been able to prove the continents of Asia and Africa as the ancient seat of human advancement and progress. The valleys of Euphrates, Ganges, Yangtse and Nile have shown the evidence of an advanced type of civilization of an early date. The Indian and Chinese developed a high culture and even evolved theories for the solution of mysterious earth through minute power of observation they had developed. A number of systems came into being with flourishing Arthimetic, Astronomy, grammer and philosophical ideas. Near about the same time, when the Indian and Chinese were considered as highly developed people, there were already in existence equally highly developed countries of Egypt and Assyria (modern Iraq) in the valleys of the Nile and the Doab of Tigris and Euphratus. These states flourished probably in the 4th millenium before Christ.

In the beginning of the 3rd millenium B.C., another civilization came into being which due to its peculiar geographical location, i.e. on an island named 'Crete' in
the eastern Mediterranean had vast geographical knowledge. These people were known as the 'Minoans'. They used to interact with people of Egypt, Levant, Sicily and Italy. Near about 2230 B.C. the Babylonians dynasty was founded at 'Ashur' near the present Baghdad. The Phoenicians, who by this time had established their commercial relationships in Mediterranean succeeded the Minoans in furthering the advancement of geographical discoveries (Rehman, 1945: 3-4).

At the initial stage of geographical thought, 'Geography' consisted mainly of: (1) knowledge about distant areas, which people gathered through travel, both on land and sea; and (2) understanding of physical features or processes going on around them. It consisted of astronomical, astrological, geographical, mathematical and historical observations. In other words, at that time there were no separate disciplines as we have today. Observe James and Martin (1981 : 21), "no one was concerned to identify himself as a member of a separate profession. There were no historians or geographers or astronomers and no professional societies to join. There were no academic departments".

2. CLASSICAL GEOGRAPHY

The beginning of the Classical Geography can be traced back to the knowledge obtained by Egyptians, Sumerians, Phoenicians, and the Greek people.
2.1 Classical Geography: The Beginning

2.1.1 Egyptians

Egyptians were the first to develop sound knowledge of Geometry, Astronomy, and Mathematics. They learnt how to fix north-south line needed for proper orientation of their monuments and public buildings. They were the first to develop art of writing and squareroot of numbers. Not only this, they also used to divide a year into 360 days, but later on realised their error. To cover up the error, they used to declare 5 days holidays each year and made additional adjustments every fourth year.

2.1.2 Sumerians

Sumerians used to divide the year into twelve months, each month had 30 days. The civilization of Mesopotamia had the world’s earliest mathematicians who had grasped basic principles of Algebra. These early civilizations also made observations of celestial bodies position and movements and, therefore, were the first to develop the science of Astrology.

2.1.3 Phoenicians

Phoenicians first to store geographical knowledge as they were in contact with very large area of Mediterranean. But their secretive and narrow policies prevented them to communicate their knowledge to others.
2.1.4 Greeks

Greeks, pioneers in many fields of knowledge, considered Geography as one of the important branches of knowledge and their colonial town 'Miletus' was the main centre for geographical studies.

2.1.4.1 Homer

Homer was the first Greek poet who wrote two long epic poems, Iliad and Odyssey, which describe the Trojan war (1280 and 1180 B.C.). It is important from geographical point of view, because it contained valuable information about Historical Geography of that time. It is learnt from Homer's work that sailors of 8th Century B.C. used to recognise the directions with the help of winds. As James and Martin explains "Boreas was the north wind - strong, cool, and with clear skies; Eurus was the east wind - warm and gentle; Notus was the south wind on the front of an advancing storm - wet and sometimes violent and Zephyrus was the west wind - balmy but with gale force" (1981:16).

2.1.4.2 Thales and Anaximander

Thales was another important Greek geographer who started the measurement of the earth and explained how to locate things on the surface of the earth. He took earth as a disc floating in water.

Anaximander was a contemporary of Thales, who introduced Gnomon in the Greek World. He was also the first
to draw a map of the world, to the scale, in which Greece as centre of the world. Anaximander and Thales are recognised as founders of 'Mathematical Geography'.

2.1.4.3 Hecataeus (475 B.C.)

Hecataeus is famous for his work Gesperiodos (description of the earth). It was the first systematic description of the world. Herodotus (4th Century B.C.), another Greek geographer, said Geography must be treated historically and history must be treated geographically. He reconstructed the shoreline and explained that many former sea ports were far inland. He also pointed out that wind blows from cold places to places that were warmer, and advocated that the world should be arranged systematically (James and Martin, 1981 : 21-2).

2.1.4.4 Plato (428-348 B.C.) and Aristotle (384-322 B.C.)

Plato and Aristotle, great Greek philosophers, have made significant contribution to the development of geographical ideas.

Plato was the first master of Deductive reasoning. He was also the first person to announce the concept of a round earth located at the centre of the universe and celestial bodies moving in circular motion around it.

Aristotle gave the idea that the best way to built a theory was to observe facts, and the best way to test a theory was to confront it with observations. So he was the
first to point out *Inductive Reasoning*. He formulated four fundamental principles of scientific explanation, as emphasized by James and Martin (1981: 26) that is:

"what makes this thing the way it is? One way is to describe its nature, to tell its essential characteristics. A second way is to specify the kind of matter, the substance, of which it is composed. A third way is to tell what causes the process through which the thing became the process through which thing became as it is. And a fourth way, which is complementary to the third, is to tell the purpose the thing fulfills".

Aristotle said there are four basic substances, namely earth, water, fire and air. He agreed with Plato’s concept of a spherical earth and gave two remarkably logical proof of sphericity of earth. He explained the round shadow on the moon during the lunar eclipse and increasing height of the stars as one travels away from the equator. He gave an idea of a *torrid-zone* (area around the equator as uninhabitable land due to intense heat).

2.1.4.5 Pythagoras (6th Century B.C.)

All the Greek philosophers believed in the idea of symmetry of form as one of the attributes of perfection, and most completely symmetrical form was sphere. Therefore, they believed that earth which was made in a perfect form for man should be in spherical form only. Pythagoras who lived in 6th Century B.C. was the first philosopher to present this idea. He also gave out some of the mathematical laws for the circular motions of celestial
bodies. His student Parmenides experimented these on the surface of the earth. But Plato, who lived centuries after the Parmenides, was the first to give the concept of a round earth located in the centre of the universe.

2.1.4.6 Alexander the Great

Alexander the great, one of the pupils of the Aristotle became king of Macedonia. His conquests had two objectives: First, to observe what lies beyond the Greek World and, second, to make a proper world administrative system. His route was from north of Ister (Danube) to Hellespont into Turkey, then to Egypt (where he founded famous Centre of geographical enquiries, the city of Alexandria), after crossing Nile, he came towards the east, from Persian empire to Samarkand, then as far as across the Indus river. His staff included writers to give details of places visited, astronomers to make observations of the bright star Canopus to fix latitudes or distance north of equator and trained pacers to measure distance. So he sent back a wealth of new information to the Greek World.

2.1.4.7 Eratosthenes : Father of Geography (228 B.C.)

Eratosthenes is called "Father of the Geography" as he was the person who gave the term 'Geography'. He is famous for making the measurement of circumference of the earth, which was remarkably close to the real circumference.
2.1.4.8 Hipparchus

Hipparchus, another Greek scholar, explained how to establish the exact position of every point on the earth, with the help of grid of latitudes and longitudes, and to show the spherical earth on flat surface. For determination of latitudes and longitudes he made an instrument astrolabe, which is an improvement upon gnomon (sundial is an instrument by which the time of the day is shown from the Sun's shadow thrown by an upright upon a flat surface. The upright that casts the shadow is called the gnomon). He also presented two types of map projections i.e. stereographic and orthographic. Another Greek geographer, Posidonius who lived shortly before the time of Christ, recalculated the circumference of the earth.

2.1.4.9 Strabo (64 B.C.)

Today, whatever we know about Ancient Geography, it is because of Strabo, because he presented lot of work on Geography, and what is more significant is that his work has been found almost intact. His work entitled Geography consists of writings of his predecessors and is considered as the world's first 'Administrator's Handbook'. He had sixteen additional volumes to his credit dealing with Europe, Asia and Africa.

2.1.5 Roman Geography

After Greeks, it were the Romans who took over as
they captured a large area of central Europe, France, Britain and Asia Minor.

Romans introduced very little that was novel. Shortly before the time of Christ Marcus Terentius Varro wrote a compendium of Geography. He gave a theory of cultural stages, implying that man originally relies on earth, then stage of pastoral nomadism comes in and then through an agricultural stage, final stage of contemporary (first century B.C.) culture. There were numerous sailing guides published during this time. One of them - which is anonymous - is most complete one, showing details of Red sea, eastern coast of Africa, as far as Zanzibar, and the northern side of the Indian ocean as far as the southern end of the Malabar Coast in India.

2.1.5.1 Ptolemy (2nd Century A.D.)

Ancient Geography came to an end with the monumental work of Ptolemy. He was the author of the great work on Classical Astronomy, The Almagest. His another work consists of 6 volumes of tables and forms acknowledged as the world’s first geographical gazetteer, on the basis of which he revised world map. He kept westernmost islands of canaries or Madeira Island as Prime meridian. He, however, increased the error towards the eastern direction, that is why Columbus, who had world map devised by Ptolemy took Asia very close to the Europe on the West. The Guide to Geography by Ptolemy consists of 8 volumes. In the first
volume there is discussion on map projections. Vols. 2-7 contains tables of latitudes and longitudes. The eight volumes contains maps of different parts of the world. Ptolemy repeated the idea of torrid zone. He also showed in his maps the Indian ocean enclosed by the land on the South, called terra australis incognita.

With the death of Ptolemy the geographic horizons, that had been widened both physically and intellectually by the Greeks, closed in again. It was many centuries before the effort to describe and explain the face of the earth as the home of man again attracted the attention of scholars.

2.2 Geography in the Middle Ages

Geographical knowledge of Greeks and Romans was that of area spread over large parts of the earth. Greeks knew much about Indus river to Atlantic and Russian steppes of the Black Sea to Ethiopia. Romans also had geographical knowledge of vast area which came under their kingdom. But during the fifth century A.D. when Roman Empire fell apart, the Europeans had lost the hold over geographical knowledge and were familiar only with their immediate surroundings.

2.2.1 Geography in the Christian World

One of the reasons, responsible for state of geographical thought was influence of scriptures on scholarly thought. Most of the scholars were compilers of information, not what observations or experiments revealed them but what scriptures dictated them.
During this time the only source of information, which could take away ignorance, was Greek works. These remained entirely unknown, except in translations, few in number. The most widely used sources, however, were of Roman geographers Pomponius Mela and Pliny the Elder, who had compiled information from Greek sources. Two medieval scholars, Martianus Capella and Ambrosius Theodosius Macrobius, were the earliest to provide translations of Plato in the 5th Century A.D. It is through them that the Christian scholars had known the concept of spherical earth but even then scholars like Cosmas gave the idea of earth as a floating disc. This was the time when Ptolemy's work *Quadripartitum* dealing with Astrology and *Almagest* which dealt with Astronomy were considered as authority in the discipline, and were translated into many languages. The geographical ideas of Aristotle were also translated from Arabic in the 12th Century (James and Martin, 1981: 41).

An important feature of medieval scholars was that they concentrated only on spectacular activities like earthquakes, volcanic erruptions or floods, and were not concerned about slower and less obvious processes like erosion of mountains, buildings of deltas, etc. Another aspect of geographical thought prevailing at this time was the deterioration of mapping. The once fairly accurate delineations of the better known coastlines were lost and maps became pure imagination. This was the period of so
called T-0 maps. In them the inhabited world was shown by a circular figure, surrounded by the ocean oriented towards the east. In the midst of the land area, used to be T-shaped, arrangement of water bodies, known at that time as Mediterranean Sea, Aegean Sea, Black Sea, Nile River and Red Sea.

2.2.1.1 Medieval Christian Travellers

When monasteries of Europe were developing geographical thought based on scriptures, a few travellers without have much geographical knowledge undertook significant travels. In 326 A.D., Helena, the mother of emperor Constantine, made pilgrimage to Rome, the holy land. Silvia of Aquitaine, was one of the earliest women geographers, who travelled over land to Jerusalem, Egypt, Arabia and Mesopotamia and presented an account of her travels.

By the eleventh century more and more people made pilgrimages. Christians tried to recapture the holy land from the Arabians, who ruled over the Jerusalem, invading Jerusalem eight times between 1096 A.D. - 1270 A.D. Initially, Muslims were tolerant, but eventually became aggressively intolerant. They closed the routes across North Africa - Southern Asia to avoid contact between European and Eastern merchants (James and Martin, 1981 : 44-5).

The most famous among the travelles of the period were Polo brothers and the son of one of them Marco Polo.
They visited China inspite of blocking of the eastern sea. They followed the inland route. Their first visit to China was during 1260-1269 and the second during 1275-1292. This time they remained in China for 17 years. While on their way to homeland, they visited Java and Sumatra, Ceylon, Southern India, Persian Gulf. Marco Polo also gave an account of Japan in his report of places visited. Marco Polo unconsciously corrected a few things since he didn't know the controversies over the facts: that there is no torrid zone; secondly, earth's circumference is erroneously calculated by Posidonius, which is too small; thirdly, Greek thought that eastern end of ekumene (inhabitable land is near the north of the Ganges which is wrong since there is land of China, Java and Sumatra, Japan etc. beyond it, as given in his report; fourthly, Indian ocean was not enclosed sea but an open sea on its southern side (James and Martin, 1981: 46).

William of Conches was another contributor who presented some ideas about the heating of the atmosphere from below and formation of clouds by cooling of air. Robert Grosseteste, the Bishop of Lincoln, was one of the earliest Christian scholars, who learnt Arabic. He was acquainted with wider range of geographic material and told the world about the notion of torrid zone.

Cardinal Pierre d'Ailly made important contribution through his work Tractatus de imago mundi (2nd ed. in 1414), in which he presented a kind of summary of the works of the
period. He was among the first who explained India can be reached through sailing towards west. Another Christian geographer Pope Pius II (Aeneas Silvius) wrote a book covering Europe and Asia (James and Martin, 1981: 47).

2.2.1.2 Navigation and Cartography

There were several important advances in the art of navigation. The first mention of the magnetic compass is found in Christian Europe in the writings of Alexander Neckam about 1187. "In this period, the astolabe had been improved and came into common use as an aid to navigation by making possible a more accurate fix on the altitude of the polestar" (James and Martin, 1981: 48).

Another improvement of the late fourteenth century was improvement in the art of mapping. The Portolano charts, of which the earliest use is about 1300, became use standard equipment for sea captains. While discussing the importance of Portolano Charts James and Martin (1981:49) states:

"The famous catalan map of the world, made in 1375 .... includes the west coast of Africa to the South of Cape Bojador.... also shows east and south east Asia based on reports by Marco Polo. This was the first map ever to give a proper outline to Ceylon and the Indian peninsula".

2.2.2 Geography in the Muslim World

Muhammad, the Prophet founded the religion of Islam, whose followers are called Muslims. Arabs who used to live initially in fragmented tribes after becoming Muslims, came
together for a purpose, taught by their holy book the Koran, and during 641-732 A.D., captured vast area of Persia, Egypt, Sahara, Iberian peninsula, France and for sometimes reigned over Spain and Portugal also. With such a large empire, their interest in the Geography took shape. With the aid of Caliph Harun al-Rashid, a project was started for the translation of works of Greeks, and brought together scholars from all faiths and regions to help them out. Soon Baghdad became their centre of activities and storehouse of scholarly information. Among the first ideas was use of the decimal system in arithmetic brought from Hindus.

2.2.2.1 Muslim Contributions to Climatology and Geomorphology

Ibn-Haukal, who was one of the Arab travellers spent 30 years of his life from 943 to 973 in travelling. During this time he visited some remotest parts of Asia and Africa and emphasized that there were numerous inhabitants around the equator. In 1921 Al-Balkhi observed and gathered some data regarding climatic features and presented world's first climatic atlas, the Kitab-al-Ashkal. In the 10th century Al-Masudi who was also a great traveller made visits as far as present Mozambique and gave a very good accounts of monsoons. He also explained the process of evaporation of moisture in the form of clouds. In 985 Al-Maqdisi gave a division of the world into fourteen climatic regions. He
said climate varies with latitudes and also along the positions east and west. The Arab geographers gave good account of processes shaping the world's landforms. Al-Biruni produced Kitab-al-Hind (Great Geography of India) in 1030. He explained the erosion by streams, with the example of pebbles found in the Himalayas. He said the erosional material becomes finer with the age of river and described about the Hindu belief that tides are effected by moon-phases. He also gave an interesting notion that on the south pole night ceases to exist.

Avicenna or Ibn-Sina gave his explanation that the hardest rock stands as mountain, while other get eroded by running water. Edrisi or Al-Iarisi wrote New Geographer and Amusement for Him Who Desires to Travel Around the World. He corrected the idea of an enclosed Indian Ocean, Caspian Sea as gulf of World Sea. Ibn-Batuta was the great traveller of all times. He visited Arabia as far as 10°5 of equator, Mozambique, Bukhara, Samarkand, Afghanistan, India, Maldives Islands, Ceylon, Sumatra, China, Spain, Sahara, Timbuktu and Niger River, which makes total of 75,000 miles, which in the 14th Century was a world record.

Ibn-Khaldun was the last of the muslim scholars to make a major contribution to Geography. He wrote a voluminous introduction to World History known as Muqaddimah and its influence, on man's characteristics, culture, way of living etc. The worked discusses man's physical environment and its influence and "with man's

67
characteristics that are related to his culture or way of living rather than to the environment". He discussed form of governments, cities and their proper location and ways of making a living - commerce, crafts and science (James and Martin, 1981 : 53).

2.2.3 Geography in the Scandinavian World

Swedes explored in the central part of Russia and sailed around the northern tip of Norway and into white sea. Great achievement of Scandinavians, however, was the crossing of the North Atlantic Ocean into the American mainland. In 874, they established themselves in Iceland. Eric the Red, an Iceland colonialist, crossed the Atlantic and settled at Greenland. In the year 1003, a man named Karlsefni, reached the coast of North America and tried to settle over there but due to repeated attacks of Red Indians had to go back to Greenland.

2.2.4 Geography in the Chinese World

"From about the second century before Christ until at least the fifteenth century after Christ, the people of China enjoyed the highest standard of living of any civilization on the earth" (James and Marin, 1981 : 55). The Chinese philosophers, had a basically different attitude towards the natural world than held by the Greeks. To the Chinese, the individual is not separate from nature but a part of it. Confucianism developed a way of life that was
highly effective in minimising the frictions among individuals.

2.2.4.1 Geographical Work

Many valuable works were composed during ancient times by Chinese peoples. These contributions are briefly highlighted by James and Martin (1981 : 56) as:

"There are weather records that date back to 13th Century before Christ. The oldest piece of geographical writing is a survey of the resources and products of the nine provinces into which ancient China was divided in the 5th Century B.C. For each province the nature of the soil, the kinds of products, waterways that provide routes of transportation are described.... in A.D. 2nd Century the Chinese carried out world’s first census of population".

Other technical inventions included making of paper, the printing of paper, the use of rain and snow gauges to measure precipitation, use of magnetic compass for navigation. By the 4th Century B.C., hydrological cycle was understood. Chinese philosopher Mencius (Meng-tzu) taught that forests once cleared from mountain slopes couldn’t reseed themselves.

Chinese basically concentrated on studies of people, descriptions of regions of China, descriptions of foreign countries, account of travels, Chinese rivers, Chinese Coast, local topographies, geographic encyclopaedias.

2.2.4.2 Explorations

The earliest record of Chinese explorations dates back sometimes between 5th and 3rd century B.C. Another is
The Travel of Emperor Mu, who ruled between 1001 to 945 B.C. and travelled as far as Persian Gulf. There were distinguished travellers like Buddhist monk Hsuan-Tsang. In the 7th Century after Christ, he crossed the Tibet and Himalayas and visited many centres of Buddhist studies in India, and brought back to China a large collection of Buddhist relics and manuscripts. Another Buddhist monk, I-Ching, who reached India by sea, also collected large number of sanskrit and buddhist relics for translation into Chinese. Nestorian Christian monk, Rabban Bar Sauma, made a pilgrimage to Rome during 1287-88. Chinese travellers also travelled through sea. They reached Japan, Taiwan, Java, Malaya, India etc. Marco Polo saw them in Persian Gulf port of Hormuz. A Chinese Admiral, Cheng Ho, made voyages to Java, Sumatra, Malaya, Ceylon, Western coast of India, Persian Gulf, Red sea, eastern coast of Africa as far as south of equator, between 1405-33.

2.2.4.3 Cartography

The Chinese were expert in map making. Chang Heng in the 2nd Century A.D. was the first to introduce grid system. The father of Chinese Cartography was Phei Hsiu who in 267 A.D. produced a map of politically organised China on 18 rolls of silk. He made use of base lines grid of east west and north-south lines crossing at right angles. Two Chinese maps were carved in stone in A.D. 1137 on the basis of survey.
2.3 Period of Discoveries

In China, after 1431-33, there was no expedition after that of Cheng-Ho (1431-33) and there was no Muslim traveller after Ibn-Batuta in the 14th Century. In Europe, expeditions were planned and supported by the government due to two reasons: Firstly, they wanted to spread Christianity (in part a response to the long series of conflicts with the spreading Muslims) and secondly, the need for spices and precious stones (James and Martin, 1981: 65-6).

2.3.1 Prince Henry

Portugal was the first country to initiate the exploration to the unknown lands and was led by Prince Henry the Navigator. First step he took was that of capturing the southern side of the strait of Gibraltar at Ceuta and then he established first Geographic Institute of the world at Sagres in 1418, where he built an astronomical observatory and a store of large collection of maps. Prince Henry brought together scholars from all faiths to work together for the improvement of skill of navigation. He also sent many probes along the African Coast, Cape Verde islands, and then around Africa, including cape Bojador, present Mauritania, and Guinea Coast, Cape Verde Islands.

2.3.2 Vasco-da-Gama

The great voyage was that of Vasco-da-Gama that took place between 1497 and 1499. He took the route of southern
Africa to northern Mozambique and then towards India across Indian Ocean. In 1510 and 1511 Portuguese captured Goa and Malacca (on the strait between Malay Peninsula and Sumatra) respectively and established their base over there and in 1542, they reached Japan and in 1590 they reached Taiwan (they gave it portuguese name Farmosa) and finally towards China.

2.3.3 Christopher Columbus

Christopher Columbus was another of great voyagers, who was born of Spanish parents at Genoa in 1451. He accepted the smallest measurement of circumference of earth and thought Asia was located where present Mexico is. When he reached southern coast of Cuba and coasts of central America, he took the place as Asia. He was however the first persons to discover and make use of the wind systems of the Atlantic.

After the death of Columbus, almost all the geographers knew about the World. It was much larger than what Columbus had thought and a new continent laid between them and Asia. During 1501-1502, Amerigo Vespucci explored the coast of Brazil and was the first to announce that the land was in-fact a new continent.

2.3.4 Fernao de Magalhaes or Magellan

Portugese explorer Magellan was the first person who reached Asia by sailing west on October 21, 1520. He was
able to discover the strait, which bears his name near southern Patagonia. Since he reached Phillipines and during his previous visit had reached Moluccas, so he had become the first man to sail all the way around the earth (James and Martin, 1981: 75).

2.3.5 The Problems

When explorers were bringing large amount of information of land to fix outlines of land and water on map from unknown land through land and sea voyages, scholars tried to get hold of this information through scientific generalizations. This was the time, when the travellers, especially who travelled through sea, faced a few problems which hindered further explorations and thus advancement of geographical thought such as navigation compass at sea couldn’t be improved till 18th century.

John Hadley’s octant was invented in 1731. In 1522, scholars understood the fact that a correct timepiece could resolve their problem of fixing the longitude. So efforts in this direction started. Another problem was pertaining to error in maps, following Ptolemaic tradition. Fra Mauro was the first to break this tradition by showing Indian ocean open on its southern side. First person to introduce the globe was Martin Behaim of Nuremburg. Martin - Waldseecmuller in 1507 showed America as a separate continent and made use of the word ‘America’ for the first time. Peter Apian in 1530 produced a heartshaped maps of
the earth in which both distances and directions were

Gerhard Kremer (1512), better known under the name of
Mercator made significant contributions as cartographer. In
1538, he produced a world map by joining two heart-shaped
maps. In 1569, he presented famous Mercator’s Projections.
It became the only world map to be used by navigators.
However, it was Edward Wright, whose trigonometric tables
(1599) made it possible for others to draw the Mercator’s
Projections. Mercator and his friend Abraham Ortelius (1527-
1598) published Ortelius Atlas - Theatrum orbis terrarum in
1570. After this large number of atlases were published and
chief centre for this was Amsterdam. In 17th Century maps
became very popular and during 17th and 18th Century map
makers added newest information to maps from time to time.
Another problem which was yet to be solved in the 15th
century was that of Terra-ustralis-incognita. Magellan
tried to find this land without getting any success.
Captain Cook also made efforts in this direction. He made
his first voyage in 1768 during which he sailed to Tahiti
till 40°S and then turned towards west to Newzealand and
explored Australia. His second voyage took place in 1772.
He sailed far in the south of the Atlantic and Indian ocean
as far as 71° 10’S. He told that he believed there was an
ice-covered land in farther south, which he couldn’t find.
In 1776, he undertook third voyage into North Pacific to
Hawaiian islands, followed coasts of North America

74
notherwards through Aleutian Islands and through Bering strait into the Arctic ocean, where he went till 70° 44′ N. Another mystery was that of shape of earth. Columbus said Earth is pear shaped. "In 1687 Isaac Newton and Christian Huygens arrived at the conclusion mathematically that the earth must be flattened at the poles and that it must bulge at the equator" (James & Martin, 1981: 87). But in 1720 Jacques Cassini gave his new calculations regarding the shape of the earth in his paper, which did not prove the concept given by Newton and Huygens and led to two surveys by French Scholars from 1735-1748 and 1736-37 simultaneously to know the reality. Results of these surveys established the fact that Newton’s conclusion was correct.

2.4 Impact of Discoveries

The information, which poured in the scholarly world through the discoveries, cosmographers tried to find new concepts through generalisations, though there was very little specialisation so far.

2.4.1 Concepts Pertaining to Celestial Space

A mystery which prevailed at that time was whether the earth or the sun was centre of the universe, with stars moving around them. In the 3rd century Aristarchus of Samos had given the concept of heliocentric universe but Ptolemy had accepted the Geocentric universe. Polish scholar, Nicolaus Copernicus carried out numerous observations of the
movements of the celestial bodies with sun as the fixed centre and results he received were remarkably positive. In 1543, he published his great work De revolutionibus orbium coelestium, in which he represented the picture of a heliocentric universe. But he still followed Ptolemy while shaping the movements of planets around the sun as circular instead of spiral. In 1618 Johannes Kepler, a German astronomer, explained that planetary motions were elliptical rather than circular and presented his work on laws of motion. In 1623, Galileo proved that Copernicus was right when he said universe is arranged in heliocentric pattern. In 1632, his book comparing the Ptolemy’s universe with Copernicus was published and was quite successful. He also gave the concept of universal mathematical order. In 1686, Newton gave his laws of gravitation.

With Copernicus, Kepler, Galileo and Newton, in about a century and a half, scientific revolution had been initiated and with this started the era of specialisation, which ending the work of cosmographers.

2.4.2 Publications

Due to lack of printing facilities there were only 3 geographers-cum-publishers to provide accounts of voyages and discoveries in the 16th and 17th centuries. The first was Giovanni Ramusio, who published Navigationi et Viaggi in three volumes between 1550-1559. It described Marco-Polo and little known Portuguese report. Another of his work, All
the Kingdoms, Cities and Nations from the Red Sea to China, was written in 1535. Richard Hakluyt in England published his collection in 3 volumes between 1598-1600 (James and Martin, 1981 : 1992).

2.4.3 Image of the Earth

The Strabo's concept of earth as home of the man was still followed by cosmographers from 15th to 17th Centuries. German cosmographer Sebastian Munster published his Cosmographia Universalis in 1544. This was in 6 volumes written in Strabo style, which dealt with picture of universe in Ptolemaic terms and division of World in Europe, Asia and Africa. In 1616 Cluverius (Philipp Cluver) gave an account of Historical Geography of Germany and a similar work was published on Italy in 1624. He also published six volumes compendium in 1624. He reported numerous examples how human character is determined by climate.

As a large amount of information was coming in, scholars therefore faced a problem of fixing up of relation between specific and general. Varenius (Bernhard Varen) described the characteristics of particular places as 'Special Geography' and these described the general and universal laws or principles that apply to all places as General Geography. He said there is close relation between the two, but did not agree that two branches shows dichotomy. He advocated these are two independent parts of a whole. He also tried to describe the world wind system.
through the amount of heat received from the sun at equatorial and polar regions.

In the second half of the 17th century the royal observatory at Greenwich was established in 1675. Edmund Halley, famous astronomer, produced first scientific explanation of the world's wind system.

2.4.4 The Origin of Continents and Oceans

Though the imaginary theories influenced by scriptures still continued but scientific investigations also attracted the attention. William Whiston, was much impressed by observations made by Edmund Halley in 1682 on comet, which bears his name and developed a theory that earth was made from debris of a second comet, and near approach of another comet was the cause of the elliptical orbit. In Germany, Abraham Gottlob Werner said that material dissolved in the water of the flood was developed over the earth to form a series of layers like the skin of an onion.

2.4.5 Origin of Landforms

Bernard Palissy in France described nature of soil and said river could easily wash the soil away if not held in place by forests. Similar view has also been expressed by John Ray, who said that water running down the slopes could slowly wash away the mountains. In 1719, John Strachey explained that landforms reflect the underlying rock structure and he was supported by Johann Gottlob Lehman who
published a study of the rocks and landforms of the Harz mountains and Erzgebirge in central Europe in 1756. In 1777 Simon Pallas published geological maps to show that many mountain ranges had granite cores. He observed the area of Siberia to understand relation between the rock structure and land forms from 1768 to 1774. In 1760 an Italian scholar Giovanni Arduino gave a classification of rocks.

In 1786, the French scholar Louis Gabriel Comte de Buat gave a mathematical equation to describe how the flowing water of a river can establish an equilibrium between velocity and load of a alluvium being transported. In the 18th century, James Hutton, a scottish geologist while supporting uniformitarianism was first to provide comprehensive treatment of the origin of landforms by processes, that can be observed today.

2.4.6 Classification of Plants and Animals

Since large amount of information regarding the new kinds of plants and animals was coming in, it became essential to categorise them. The English Person John Ray was the first to describe the ways of classifying plants, fishes and other animals. He published his work entitled The Wisdom of God Manifested in the Works of Creation in 1691. LeMarck was first to show the need for a system of classification for plants and animals based on their natural characteristics and said, some animals can develop their organs as per need, which would be inherited. Darwin later
on added the mechanism of natural selection as the cause of evolution rather than need or use (James and Martin, 1981: 102). In 1662, William Petty and John Graunt gave kinds of statistical studies. The first mortality rate was collected from 1687-91 for the city of Breslau by Edmund Halley. German scholar J.P. Sussmilch was first to show existence of statistical regularities. The sexes he thought try to remain balanced and birth and death rates could be predicted.

2.4.7 Influence of Environment

Jean Bodin, a French political philosopher, explained influence of planets on the behaviour of earth's inhabitants. He said people of the southern hemisphere are religious due to the rule of Saturn on the southern hemisphere and that people of the northern hemisphere's inhabitants are warlike and good at use of mechanical devices due to influence of Mars, and people of the middle regions are ruled by Jupiter and therefore are civilised. Montesquieu, another French political philosopher in the 18th century, presented a law that politics is influenced by climate i.e. sterility of the ground leads to establishment of popular form of government and fertility of soil leads to an aristocratic government.

2.4.8 Natural History

New efforts were put in for the development of new hypotheses, new methods of classification, and new ways to
make use of mathematics. One of these new ventures was; wore by Count Buffon, who was the first to concentrate on man as an agent of change and developed an idea of cooling of earth (James and Martin, 1981 : 105).

James Rennell’s work *An investigation of the Currents of the Atlantic Ocean and of Those Which Prevail Between Indian Ocean and the Atlantic Ocean* was the first authoritative and comprehensive view of the movements of ocean water in the Atlantic. He is also considered as founder of Oceanography.

2.4.9 Population and Food

In 1798, when Thomas Robert Malthus published his essays, these were considered as brilliant achievement of the period. He explained that "population tends to increase geometrically, whereas the food supply can only be increased arithmetically; and population always increases until it reaches the limits of subsistence, after which it is checked by war, famine and pestilence" (James and Martin, 1981 : 108).

By middle of the eighteenth century the vastly increased volume of new information about the world required a search for new perspectives and new ways of organising, what had been called cosmographies. This was the time when "universal geographies" began to appear replacing the older type of descriptive Geography (James and Martin, 1981:108).
In the 18th century French geographer Philippe Buache gave the concept of an earth marked off into major basins bordered by continuous ranges of mountains, and identified land hemisphere for the first time. A German scholar, Friedrick Bushing, discussed Europe in his 6 volume book *Neue Erdbeschreibung*. He also used density of population as a geographic element for the first time. He taught that transportation of goods by water can be very economic.

Malte Brun, a Dane geographer, published *Universal Geography* in 8 volumes between 1810-1829. He gave details about history of Geography, outline of geographic concepts, various theories of origin of earth, etc. Emmanuel Kant, a German scholar, presented his famous book, *Critique of Pure Reason*, in 1781. He disagreed with teleological idea of final causes and insisted that explanations must be sought in what is chronologically antecedent. He is also famous for his lectures on Physical Geography between 1756 and 1797. He also tried to assemble and organise wide range of material from a wide variety of sources.

3. MODERN GEOGRAPHY

The contributions of Humboldt and Ritter have been highlighted by James and Martin (1981:112-3) as significant development of Modern Geography as:

"Many writers refer to Humboldt and Ritter as founders of modern geography. But there are also
good reasons for thinking of them as bringing the period of Classical Geography to an end. Using the large volumes of new information resulting from the voyages of exploration, Humboldt and Ritter, each in his own way, produced massive syntheses. Although these syntheses made use of the new concepts and methods of study developed during the preceding two centuries, they, nevertheless, sought to present universal knowledge, just as Strabo had done and as had been attempted during the Age of Exploration by Munster, Varenius, Busching and others. But since 1859 the volume of recorded observations about the world and man’s place in it has increased many thousand times. In the 19th century, the Age of Specialisation came into being. No longer could any one scholar hope to embrace universal knowledge. The classical period had come to an end."

3.1 Major Contributions

When we think of modern Geography, two names especially came to our mind: Alexander Von Humboldt and Carl Ritter, who made an incomparable contribution to the modern Geography.

3.1.1 Alexander Von Humboldt: Wide Ranging Observations (1769-1859)

Humboldt started his studies from a trip from Rhine to Netherlands and then to England. Stimulated by lectures of A.G. Werner (who gave the hypotheses that rocks of the earth had been formed by precipitation under water and had been deposited in layers). Humboldt studied the effect of magnetic declination on different rocks in mines and published results in 1793. He visited Bavaria, Austria, Switzerland and Italy and observed the rock structure. In Paris, he gathered many instruments and learnt how to handle
them. These included Hadley Sextant barometers, thermometers, Dollond telescope, chronometer, electrometer, Dollond balance, eudometer, cyanometer, Borda magnetometer aneroid barometer. All these were collected keeping in mind his scientific explorations.

Humboldt and a French botanist named Aime Bonpland left for Latin America with which started their scientific exploration. Throughout their explorations, they used all the collected instruments and measured latitudes, longitudes, precipitation, pressure etc. They started with Cumana in Venezuela. They went to Caracus Basin of Valencia in the midst of which there is lake of Valencia. Here they tested the theory of Buffon that there is a connection between the removal of forests and drying up of rivers. They mapped 1725 miles of the orinoco river. In 1800 they surveyed Casiquiare, collected thousands of plants and rocks specimens. Then they sailed for Cuba. In 1801, they reached Colombian part of Cartagena and explored Andes of Colombia, Equador and Peru. Here Humboldt presented scientific description of the relation of altitude, air, temperature, vegetation and agriculture in tropical mountains, and his descriptions of the vertical zones of the northern Andes is a classic. They examined various volcanoes of Equador and said that A.G. Werner's idea about origin of rocks was wrong. On June 9, 1802, they reached at an altitude of 19,286 feet and described the mountain
sickness or Soreche. They said it was due to low pressure. After this, they visited Lima, Peruvian coast and for the first time described the movement of ocean water and upwelling of cold water from below. They named it "Peruvian Current" (James and Martin, 1981: 119). In 1803, they went to Mexico. In new Spain they updated the population figures and found a rich collection of statistical data on production and trade. Then they sailed for Havana, Cuba and also visited the United States. After that Humboldt remained in Paris and published results of his explorations in 30 volumes entitled *Voyage aux regions equinoxiales du Nouveau Continent*. He also put his 60,000 plants specimens in order during this time. It left enormous impact on scholarly world and was translated in many languages. He said his purpose was "to win the attention of educated but non-scientific readers for the fascination of the discovery of scientific truth" (James and Martin, 1981: 121). It presented excitement of travel in strange places and at the same time reports of careful scientific investigation. In 1805, he presented a synthesis of his detailed findings as a basis for the study of Plant Geography. His *Essai politique sur le Royaume de la Nouvelle Espagne* was one of the world’s first Regional Economic Geography. He also taught that the only way to increase the general prosperity of a country was to make more effective use of natural resources. He also visited Siberia as far as borders of China and shores of Caspian Sea. He could see
that temperature varied at the same latitude in accordance with distance from ocean and produced * Isotherms* for the first time. He also gave concept of *Permafrost*. In 1845 first volume of the prestigious work *Kosmos* was published and in best literary style. It put together all the various interests and discoveries of Humboldt's lifetime.

3.1.2 Carl Ritter : Unity in Diversity (1779-1859)

Carl Ritter at an early age derived the idea of unity in diversity from the richly varied landscape. He was an influential lecturer. His purpose was to understand the interconnections, the causal relationships that make the areal associations cohesive. To describe his work on scientific Geography, he used the German word *Erdkunde* which means Geography. He said Geography should be empirical in the sense that it should progress from observation, in search of general laws and not from preconceived opinions to hypothesis to observation. He was the first to point out error in Buache's concept of continuous mountain chain.

Ritter's use of concept of unity in diversity led him make use of the regional approach to Geography instead of systematic study of individual features. But he said systematic Geography is equally important. The concept which really led to obscurity was his identification by the colour of skin of races. Another important feature of Ritter's work was that he saw in all his geographic studies,
the evidence of God's plan, as he said, Asia represented sunrise and here the early civilisations of man originated; Africa represented noon and inhabitants are therefore not willing to come in contact with outsiders. Likewise, Europe presented sunset and symbolises man's greatest achievements.

Ritter's major scholarly achievement was *Die Erkunde* which is "The Science of the Earth in Relation to Nature and the History of Mankind; a General Comparative Geography as the Solid Foundation of the Study of and Instruction in the Physical and Historical Sciences" (James and Martin, 1981: 130).

### 3.1.3 University Programmes

The University as an education institution first appeared in Medieval Europe, but dominated fully by religious authorities. The University of Paris in the twelfth and thirteenth centuries became the chief center for the teaching of orthodox Christianity, other than Rome. In 1809, Wilhelm Von Humboldt founded the university of Berlin and it was in Germany only, where Geography as a field of advanced studies appeared for the first time, i.e. in 1874. Within a few decades Geography departments offering graduate training leading to degrees appeared in Germany, France, Britain and many other countries of the world.

### 3.1.4 New Geography

During this period 'New Geography' was introduced. It was "New" because as a flood of new information continued
to flow in the world of Scholarship, but now the attention was given to the similarity rather than to strange, different, imaginative and illogical things. The seventeenth century started the scientific revolution that led to the development of more useful ways of generalising, explaining and communication. The scholarly efforts to provide more exact descriptions of specific things was replaced by the efforts to formulate general theory in relation to which specific things could be made significant. In the process, controlled experimentation began to bring good results. As bodies of theory developed and proved useful, special fields of study appeared, each defined in terms of the segment of the universe being investigated. These new fields of study became division of knowledge, each with its method for description and demonstration. So, now the 'general Geography', was divided into many separate logical disciplines like physical sciences, biological sciences, social sciences, and humanities, giving entirely different form i.e. 'New Geography' (James and Martin, 1981:136-7).

The characteristics of New Geography are discussed by James and Martin (1981:143) as:

"Geography was left with three major tasks: one was the continued collection of information about the still unknown or inadequately known parts of the earth, and representation of this information in useful form. The second was the study of particular places in the world, whether for the purpose of throwing light on the processes at
work in them as for the practical needs of government administrators, military commanders or businessmen, who needed clear descriptions of the fact and conditions relevant to particular problems. And the third task was the formulation of concepts: empirical generalizations, hypotheses, and perhaps even theory."

Keeping in mind the above three tasks, new cartography was needed. Lithography was invented in 1800. Electrotyping and photography was developed between 1840 and 1850. Earliest cartographer was Adolf Stieler who published atlas containing 75 maps. Another was Heinrich Berghaus, who established school of Cartography in Germany and published many atlases containing 93 maps. Eric Von Sydow was on to set the standards for use of blues and greens on hypsometric maps.

August Petermann founded the famous geographical periodical, *Petermann's Geographische Mitteilungen*, and published 850 maps, including topographic maps, which was his highest achievement. In 1874, The *Statistical Atlas of the United States* was published under the direction of Walker.

Elisee Reclus, French Geographer, published his two-volume descriptive systematic Geography in 1867-68 entitled *La terre* Louis Agassiz described glaciers and the effects of glacial action in producing distinct kinds of mountain landforms.

3.1.5 Professional Societies

An emerging characteristic of this era was
foundation of geographic societies, James and Martin (1981:61) give details:

"Various geographical societies were founded, during the 19th century. By 1875 there were twenty eight geographical societies in Europe and one in Cairo. The meetings of these societies and the periodicals each of them published were devoted to accounts of scientific expeditions in different parts of the world. The first international geographical congress was held in 1871.... The International Geographical Union was founded in 1922 to tie all these and other geographical activities together and to coordinate their programme."

3.2 Geographic Thought in the USA

George Perkins Marsh presented a book on the habits and use of camels and another on the origin and history of the English language, and one of history of Geography and one on history of geographical ideas. Another American Matthew Fontaine Maury devised new instrument for sounding ocean depth and was first to produce the map of floor of the North Atlantic ocean and ocean currents of the Atlantic. He also gave an idea of atmospheric circulation of winds and open polar sea. In 1875, James H. Coffin prepared wind map of the world.

In addition to the collection of new data on population, ocean and climate, another feature of Geography was the systematic survey of unsettled territories. Lewis and Clark explored Missouri River from 1803 to 1806.

Geography as a subject in schools and colleges were introduced in the mid of 19th century. American Geographical
Society was started in 1851. Arnold Gayot, who was a student of Physical Geography, explored the Appalachian mountains for over 30 years. His philosophy agreed with that of Carl Ritter. Shaler wrote his *Nature and Man in America*. In this he described the effect of physical conditions of the earth on the development of organic life in general and with special stress on the origin and character of the relief and climate. William Morris Davis, a geologist, was a student of Shaler. In 1877, he developed the theory of 'cycle of erosion', which he defined as 'Geomorphological Cycle'. In 1899, he presented 'Theory of cycle of erosion'. He discussed the river erosion and stated that "when an initial surface is raised, rivers at once begin the work of erosion. The surface is cut by narrow V-shaped valleys that are extended headward as more and more of the initial surface is consumed. But rivers cannot cut down their valleys indefinitely. There is a base land below which river cannot cut - a level determined by the surface of the body of water into which a stream flows". (Majid Hussain, 1990 : 156). He also focussed his attention on regional Geography. But in the later years of his life, he concentrated on ecology.

Mark Jafferson was one of the pupils of William Morris Davis. He was the founder of man-oriented Geography and worked for generalizations regarding man's imprint on the land. The concept of 'central places', the law of
'Primate City' and the 'Civilizing-rails' were given by him only. His approach was mainly ecological, which led to further understanding of human groups in their environmental settings.

Isaiah Bowman was student of Jafferson. In the beginning he was an environmental determinist, but later on gave adequate importance to the role of man in transforming his natural environment.

Ellen Churchill Semple (1863-1932) was a student and follower of Ratzel. In 1903, she published *American History and Its Geographical Conditions*. She also gave her version of the first volume of Ratzel's *Anthrogeograpie* in her famous work *Influence of Geographical Environment*, published in 1911. She was a determinist. While discussing her deterministic approach Majid Hussain (1990:160) rendered her original statement which is:

"man can be studied scientifically only by the grounds he tills, or the lands over which he travels, or the seas over which he trades. Man's relations to his environment are infinitely more numerous and complex than those of the most highly organised plants and animals. So complex are they that constitute a legitimate and necessary object of special study ... all the sciences together with history, so far as history undertakes to explain the causes of event, fail to reach a satisfactory solution of their problems largely because the geographic factor which enters into them all has not been throughly analysed."

Albert Perry Brigham, another American geographer, concentrated initially on the Geology and Geomorphology. For
this he also worked with Shaler, a well known geologist of the period. But afterwards he developed interest in the study of human group and was critical of environmental determinists.

Ellsworth Huntington (1876-1947), who was also a student of Davis, was an environment determinist, and tried to explain the styles of life of human groups in their weather and climatic conditions. According to him "Changes in the sun are a major cause of changes in the terrestrial climate, and climate profoundly influences man, his culture other forms of life and geological processes" (Majid Hussain, 1990:162).

Rollin D. Salisbury contributed in the development of Geography in the U.S.A. between 1903-1919 by writing several books. He was mainly interested in Physical Geography. But didn’t agree with the idea of simple cause and effect between the physical earth and the human response.

3.2.1 Between the two World Wars

Development of Geography between the two world wars is described by Majid Hussain (1990:163) as:

"During the Inter-war period, there occurred a shift towards social aspects from the physical side. Geographers of America started describing the unique features of places and regions and there was very little focus towards the formulation of general concepts. Much attention was given to the information and use of concepts and models; and many principles and ideas current in 1970's had their origin in the inter-war
period. During this period Social-Darwinism was under attack. The strong environmental determinism was rejected and the simple cause and effect relationship was also not accepted."

3.2.2 After the Second World War

After the Second World War there was a change in the conceptual framework of Geography in the USA. American geographers felt that for proper development of the subject, they must get rid of all round synthetic approach of Regional Geography. "The American geographers have shifted emphasis on 'systematic specialisation', which means the study of a particular phenomenon over the earth and the process that lies behind their spatial arrangement. Thus, they are focussing attention on 'man-environment system' with an ecosystem approach" (Majid Hussain, 1990 : 167).

Americans now stress on the application of statistical tools, especially during the last 30 years, to investigate the geographical distributions and arrangements. These statistical tools are applicable to physical as well as social phenomena. Mathematical concepts and the laws of Astrophysics are used to measure and explain the functions, size and spacing of urban centres and crops distribution.

The new trends in American geographical thought after the second world war are emphasised by Majid Hussain (1990:167) like:

"The new trends, besides being quantitative or statistical in approach are concerned with the 'analysis of spatial system which reveals two other important facets. First there is a shift of
emphasis towards group behaviour in the assessment of the relations between man and environment, currently referred to as 'spatial perception'. Second, there is concern with current social problems and the utility of research in coping with them. Moreover, with the help of quantitative techniques, the geographers are developing 'regional science'."

Inter-disciplinary approach to explain the man-environment system has been adopted by the American geographers. Emphasis is also being laid on Cultural Geography. The usual approach of a Cultural Geography is that of studying spatial distribution of the elements or traits of a culture. Political Geography is also an area in which the American geographers are increasingly contributing. Another area in which the Americans are pursuing work is the Locational Theory studies.

Apart from computer technology, areal photography, the American geographers are making the use of remote sensing technology for the interpretation of geographical phenomena. Moreover, Geography is generally recognised as a laboratory study and large cartographical laboratories are available for map collections and exercises, simulation models and quantitative analysis. Geography in the America is considered as a Social Science.

3.3. Geographic Thought in Europe

3.3.1 Germany

In 1809, University of Berlin was founded. After middle of the century, students were freed from the standard
curricula and were permitted to select whatever courses of study interested them and, secondly, appointments to positions on the faculties were made on the basis of scholarly performance and, after an appointment was made, the faculty member was granted the right to engage in research and to teach the results of his research. There were centres of geographic research where the observations of scientific travels could be collected and where new maps were being devised to present this information in useful form. Geographical Societies were also organised so that latest knowledge about the earth could be presented through lectures and periodicals. But advanced instructions in universities lacked since there was no place where teachers of Geography could be trained. It was only in 1870’s that Geography as a field of advanced studies appeared in universities. Situation was same in other European countries as well as in America. The James and Martin (1981:164) describe:

"There was no professionally accepted paradigm to serve as a guide to the study of Geography.... In the absence of any guidelines regarding the field of Geography, each new professor felt the need to set forth his own ideas concerning the scope of the field. Each tried to provide a definition of Geography, that would give it unity and that would establish its position among other academic disciplines.... Geography was anything that could be put on a map."

In Germany, one of the founders of modern Physical Geography was Oscar Peschel. He worked on foreign affairs
of ancient Geography, Fjorded Coasts nr Western Sides of continents in higher middle latitudes and suggested the hypothesis that "Fjords were fissures in the earth’s crust that had been occupied and gouged out by glaciers" (James and Martin, 1981 : 165). His systematic study of these features together with lakes, Islands, valleys and mountains was published in 1870.

Another German geographer was Ferdinand Von Richthofen. He carried out geological studies in the Alps and Carpathians. In 1860, he undertook an expedition for eastern Asia for the study of land and resources and sailed across the Pacific to California. He was first to map Chinese Coal field and formulated hypothesis to explain Chinese surface features. He was also the first person to identify the powdery material covering the land on the eastern side of Gobi as Wind blown dust of Loess. His studies of China were published in five volumes between 1877-1912. According to him, "It was the distinctive purpose of Geography, to focus attention on the diverse phenomena that occur in the interrelation on the face of the earth. The highest goal of Geography is the exploration of the relationship of man to the physical earth and to the biotic features, that are also associated with the physical features" (James and Martin, 1981 : 167). He also described 'Special Geography' and applied the term 'Chorology' to the Regional Geography.
Friedrick Ratzel was provided the guidelines for a comparative systematic study of Human Geography, and gave the concept of 'Anthropogeography'. He visited countries around Mediterranean, Hungry, Translyvania, Alps, U.S.A. & Mexico. He published his ideas pertaining to systematic study of human and, in 1882, published first volume of Anthropogeographie, in which he traced the influence of different physical features on the course of history. He applied Darwin's biological concepts to human societies knowns as "Social Darwinism". According to this, group of human beings must struggle to survive in particular environment as much as plants and animals organism must do. He also published Political Geography. In this he gave an idea that a state, like some simple organism, must either grow or die and can never stand still (James and Martin, 1981 : 170).

Geography in Germany has been described variously. Some said human Geography must be excluded entirely and geography must be what the word "Erdkunde" implied, that is the study of the whole earth body without reference to man. George Gerland said "physical science can formulate exact laws but no such laws can ever be formulated to account for the behaviour of human groups". Alfred Hettner said, "If we compare the different sciences we will find that while in many of them the unity lies in the materials of study, in other it lies in the method of study. Geography belongs in
the latter group; its unity is in its method..." (James and Martin, 1981 : 172).

In order to give the study of Geography a balanced nature, the concept of Landschaftskunde was introduced. J. Wimmer introduced this concept which means 'overall appearance of landscape' in 1885. The concept, however, became popular after its use by Otto Schlutter. He said geographers look at surface of the earth as perceived by senses and totality of such perception is landscape. Hettner and Schlutter were concerned about the variations in the character of the face of the earth, which was later known as areal differentiation. Both recognised that there were distinctively different kinds of areas and showed certain degrees of homogeneity as well. But Hettner stressed the way features of a region are reflected, whereas Schlutter concentrated on interrelations of these features.

It was commonly believed that general (or systematic) Geography is necessarily analytic and makes use of general concepts whereas Regional Geography is necessarily synthetic and deals with unique situations. Albrecht Penck was the first scholar to use the term 'Geomorphology', to refer to the origin and development of the earth's landforms and showed how the systematic study of physical features can be approached from the chorological point of view. In 1910 Penck suggested the hypothesis that the climate of a region, so impresses itself on the observable features of the
landscape, that a classification of climates can be made even where instrumental records are lacking. He was first to point out that effective rainfall of place is a balance between rainfall, run off and evaporation and that evaporation increases with higher temperatures. He said maps are essential for the study of Geography and suggested in 1891 that various nations of the world should cooperate in the production of an international map of the world at scale 1/1000,000.

Siegfried Passarge studied the landscape of Kalahari desert and published it in 1904. He rejected the description of landscape as unique and said landscape must be seen as a type and a landscape type is an assemblage of interrelated elements.

Gerhard Schott published two volumes on hydrological conditions, climates over the ocean the configuration and geological structure of the ocean basins, the marine organisms, the areas supporting fishing industries, the routes of ocean commerce, and the air routes over the ocean, the history of discovery, and explorations and maps of ocean features. He produced a map of oceanic regions.

The rise of Nazi state made studies in objective scholarship more and more difficult. However, in 1931 Robert Gradmann published his work on southern Germany. Walter Christaller gave his central place theory. Cartographer Max Fckert, German formed the "Deutsche Kartographische Gesellschoaft" in 1937 for the promotion of
cartography as a separate discipline. One deviant stream of geographic thought developed between the wars was the application of geographic concepts to politics. This was given the German name Geopolitik which is different from Political Geography "is the art of using geographical knowledge to give support and direction to the policy of a state as stated by Karl Haushofer who published, in 1924, Geopolitik des Pazifischen Ozeans" (James and Martin, 1981: 185).

After World War II, by 1960, German Geography regained its position of importance. In early 1960's there were 53 departments of Geography. The German geographers continued their traditional concept of Landschaftskunde but with the use of new and more precise methods of analysis. They also focused on 'Cultural determinism' instead of 'Physical determinism'. The new emphasis on culture is known as 'Social Geography'. The purpose is to interpret the cultural landscape but with clear understanding that major agency for change in landscape is a human group - the attitude, objectives and technical skills are the parts of human culture. The German geographers have contributed to Physical as well as Human Geography. These include H. Bobek, H. Mortenson, H. Schmithenner, and C. Troll. Physical Geography is subdivided into Geomorphology, Geophysics, Meteorology, Climatology, Oceanography, etc. Cultural Geography has also been subdivided. There are also
subdivisions shared between Geography and other disciplines.

3.3.2 France

The 'New Geography' which appeared in Germany spreaded to other countries. In 1827, a French army officer published two works on geographical methodology showing all the drainage basins bordered by ridges or mountains as Buache had done. Teaching of Geography in France, lacked trained teachers as in Germany. There were no geographers to teach in colleges. Chair of Geography was occupied by historians.

Paul Vidal de la Blache was one who took chair in 1896 and led the development of New Geography in France. He devoted 26 years for training of teachers of Geography and making up-to-date materials and ideas available to them. He taught to focus attention on relationship between man and his immediate surroundings by studying small homogeneous areas. He was a strong opponent and critic of environmental determinism. From Ratzel's *Anthropogeographie*, he derived the concept of Possibilism. Nature, he said, set limits and offered possibilities for human settlement but the way man reacts adjusts to these given conditions depends on his own traditional ways of living. His *Human Geography* was published in 1921.

By the year 1921, there were departments of Geography in almost all the 16 French universities. In almost every
case the teachers appointed to teach Geography were pupils of Vidal. These pupils spreaded throughout France the point of view and method known as La Tradition Vidalienne. One of them was Jean Brunches, he prepared the classification of geographic facts. He described geographical analysis under the heads of Human Geography, Regional Geography, Ethnographical Geography, Social Geography, Political and Historical Geography. The French geographers didn't give any consideration to dichotomy between Physical Geography and Human Geography. Jean Brunches led the development of Human Geography and Emmanuel de Martonne led the Physical Geography. Emmanuel maintained interests in central Europe, Climatology and Geomorphology. He became most influential geographer of Europe between the two world wars. He was also a strong supporter of Davis. His work on the identification of arid regions through the use of an aridity index was a major contribution to the systematic study of climate. After 1920 Geography was considered as a unitary subject while some said it is combination of variety of subjects. So, Geography is both a unitary and autonomous field of study and also an auxiliary aspect of many fields.

Vidal said that the field study of relatively small regions was the best possible way to train geographers and thought it could serve practical needs. So he planned a series of books covering the whole of the earth's land areas. This work was carried out under the direction of
Lucien Gallois. The whole series is a monument to the professional work. Its last volume was published in 1948. It deals with economic conditions, population, political boundaries, physical earth and its cover of vegetation. Since World War II geographers concentrated on scientific Geomorphology. The fundamental mathematical techniques have been established in most academic curricula. Involvement of geographers in comprehensive planning process is the marked features of modern French scene.

3.3.3 Britain

Geography drew very little attention in Britain until the middle of 19th century. Still, exploration of new land, description of travels and voyages, description of the newly discovered lands and their people were considered as areas of geographical studies. It was in 1859 when Darwin published his 'Origin of the Species' which attracted the attention of biologists, geologists, sociologists, and also that of geographers. Now British geographers started considering earth as the home of the man. By the end of 19th century, Geography was introduced in British universities.

Halford J. Mackinder (1861-1947) is founder of British Geography. He considered Geography as a bridge between Humanities and Natural Sciences and between History and Geology. Initially British Scholars concentrated on Physical Geography and ignored the role of man, but
Mackinder identified Geography as a discipline that traces the interaction of man and his physical environment. In 1904, he gave the concept of 'Geographical Pivot of History' also known as Heartland Theory of Mackinder. In this he recognised 'World Island' consisting of the continents of Eurasia and Africa. The most inaccessible parts of the world, he called Heartland. In 1902, he published *Britain and British Seas* and in 1919 his *Democratic Ideals and Reality*.

Sir Patrick Geddes, a Scottish geographer, carried out research on family life styles and family budgets. The Geddes scheme was used in teaching of geographic ideas between the wars by regional and city planners for their surveys. So he was a founder of British Regional Studies, especially regional survey, regionalisation and applied Geography.

Economic Geography was popular in Inter-War periods. Buchanan presented his book *Pastoral Industries of New Zealand*, in which he investigated the influence of physical environment on the economic conditions. In 1949, W. Smith produced *Economic Geography of Britain*. Chisholm produced *Handbook of Commercial Geography* and H. Robert Mill wrote *General Geography*. Under his supervision rainfall maps of Britain were prepared on the basis of 50 years average. In 1905 Herbertson prepared a framework of natural regions for the study of world Regional and Economic Geography.
The man-nature interaction concept dominated the British Geography from the later parts of the 19th Century till the First World War. Geography was considered as the description of earth's surface and its influence on man. Forde published *Habitat Economy and Society*, on primitive society to show the influence of environment on the occupation and mode of life of the people. At the advent of the 20th Century, Applied Geography became an important field of geographical research. In 1920, L.D. Stamp prepared the Landuse maps of Britain. These were used for planning of emergency crop expansion during wars. Historical Geography was area of concentration after the First World War. Mackinder founded the Human Geography in Britain. He stressed that geographers should try to rebuild past geographies and show how sequence of change have led to the present observable features, otherwise Geography would become a mere description of contemporary features. M.I. Newbegin, E.G.R. Taylor, E.W. Gilbert, and H.C. Darby were prominent scholars in the field of human Geography. Environmental degradation, ecological crises, environmental management, inter-regional and intra-regional inequalities in the society, Medical Geography, landscape ecology, are some of the new areas in which British geographers are concentrating (Majid Hussain, 1990 : 152-53).
4. DEVELOPMENT OF INDIAN GEOGRAPHIC THOUGHT

4.1 Ancient India

Very little is known about the Indian geographical concepts in Ancient India. However, some "valuable information is contained in the Hindu mythology, philosophy, epics, history and sacred laws. Chronologically, the Vaidikas, the Ramayana, the Mahabharta, the works of Buddhists and Jains and the Puranas are the main sources of Ancient Indian geographical concepts" (Majid Hussain, 1990: 66).

The Ancient Indian geographical concepts revolved around religion, so much so that even relief features on the surface of the earth were seen with reference to religion. As Hussain (1990: 66) further observes, "The Ancient Indian Geography hinges on religion. Every physical phenomenon, every major or spectacular landwork on the earth's surface has a religious background for Indians. Every mountain, every peak, every river, every crag, every huge or useful tree is sacred and is preserved in these traditions".

Besides Vedas, Puranas and Upanisads, the information about geographical concepts in India have been collected from accounts by foreign travellers, who visited India from time to time. Their account reveal that Ancient Indian scholars were very much familiar with the physical conditions of their neighbouring lands such as China, South East Asia, Mesopotamia and Trans-Oxus Asia.
Also, the work of Varahmihira, Brahmagupta, Aryabhata, Bhaskarcharya, Bhattila, Utpala, Vijayanandi, and others have "substantially helped in the development of the Astronomy, Mathematical Geography and Cartography.... The term Bhogola (Geography) in Indian geographical literature was used for the first time by Suryasidhanta, and in the Puranas a difference has been made between Bhogol (Geography), Khogol (Science of Space) and Jyotishastra (Astrology)" (Majid Hussain, 1990: 67).

4.1.1 Origin of the Earth

According to Law (1934) "ancient Indian scholars believed in the solidification of earth from gaseous matter. The earth Crust according to them was made of hard rock (Sila), clayey (Bhumih) and sandy (Asma)". But some of the upanisads have attributed the origin of the earth in the water (subalopanisad 1.2, Kantharudropanisad 18, Paingalopanisad 1.6, Brihadaranayakopanisad 1.2.2, Chandogyopanisad 1.1.2). Though propounded in the preceding Vedic times, it has been emphatically maintained that the hypothesis cannot be a debated question" (Tamaskar, 1988: 53).

4.1.2 Shape of the Earth

As far as shape of the earth is concerned, the word Bhogola (Geography) in the ancient Indian literature explains to us that scholars at that time believed in
spherical form of earth. "The spherical shape of earth was visualised by Aitareya Brahmana, who stated that Sun neither sets, nor rises. We feel that it sets, but in reality at the end of the day it goes to the other side. Thus it makes night on this side and day on the other" (Majid Hussain, 1990: 69). Not only this, Ancient Indian astronomers investigated and believed in Geo-Centric Universe. "In the Rigveda is the description of 34 heavenly bodies including the sun, the moon, five grah (planets) and twenty seven constellations" (Majid Hussain, 1990 : 68).

4.1.3 Size of the Earth

In the literature of the fifth and sixth centuries A.D, there is some information regarding the size of the earth. "According to Pancha Siddhantika (Verse-18), dimensions of the earth is 1018.6 Yojanas/8148.8 miles/13038 kms. But according to Aryabhata this calculation is 1050.0 Yojanas/8400.0 miles/13440 Kms" (Majid Hussain, 1990 : 70). The estimates made by Surya-Siddhantika and Aryabhatta are very close to the established facts.

4.1.4 Land and Water Ratio

The Aryans thought that there is more land in Northern Hemisphere as compared to Southern Hemisphere. Upanisads showed "ratio of the lithosphere and hydrosphere to be 1:2 (Brihadaranya kopnisad 3.3.2) on the terrestical globe, perhaps, estimated on the basis of the earlier and contemporary extensive land travels and sea voyages"
4.1.5 The Earth in Space

In upnisads, this is particularly mentioned that earth maintains itself in space by some force. As Tamakskar (1988: 54) explains, "It has been categorically maintained (Chandogyopanisad 7.6.7) that the earth exists in the space by balama (force). To the common man planets and stars including the moon and the earth, appear to be without any support in space".

4.1.6 Latitudes and Longitudes

The Indian astronomers used the term Akshansa for latitude and Deshantras for longitudes. On the basis of latitudes, they used to divide the earth into various parts, like Niraksadesa represented the equatorial belt and Meru, the North Pole, and Lanka (Ceylon) is on equator. The longitude passing through Ujjain and Lanka and Mt. Meru worked as Prime Meridian for the Indian astronomers.

4.1.7 Cardinal Points

Initially there were only four directions, i.e. Purva (East), Paschima (West), Uttra (North) and Dakshina (South), with the addition of Zenith (Meru) and Nadir (Badavanala), it was raised to six. After this eight to ten directions were often mentioned in Puranic literature.
4.1.8 Local Time

The knowledge of ancient Indian scholars can be estimated from the fact that they were very much aware of the local time of a place, depending upon the position of the sun or the moon in the sky and it differs from those of other places and situated along other meridians. They even devised a method of calculating these differences with the help of lunar eclipse.

4.1.9 Earthquakes

For the earthquakes the term Bhukampa has been used by the Puranas. According to scholars, earthquakes were caused by the deities like Vayu (air), Agni (fire) and Indra and Varuna (water).

4.1.10 Atmosphere and Climate

Majid Hussain (1990 : 72) shows the familiarity of the Aryans "with the atmosphere, weather and climate. According to them the earth is surrounded by Antriksa (atmosphere/ space)... Ramayana furnishes a lots of information regarding atmosphere.... Bhaskarcharya has conceived the thickness of the atmosphere to be 12 yojanas (154 kms.)".

As far as change in temperature is concerned, two reasons are named, hot and cold. When the land is unusually hot, then it is a common saying that it will rain, because heat generates water vapour, and it is accepted by Upanisads
as stated by Tamaskar (1988:56) in this context states:

"The heated air is set in motion upwards and obliquely, accompanied by flashes of lightning and thunder (Chandogyopanisad, 7.11.1).... The heating of the atmosphere raises dhuma (water vapour) forming abhra (cloud) and megha (thick cloud) leading to flashes of lightning and condensation following by rains. This model is clearly a result of systematic, careful and minute observation. The subtle distinction between abhra and megha and the use of the term parvatada is noteworthy. The term parvatada signifies dense clouds resembling mountains (Saraswati Rahasyopanisad 11)".

Not only this, relief rains are also described.

As far as seasons are concerned "Rigveda mentions five seasons i.e. Vasanta (spring), Grisma (summer), Prourit (rainy season), and Sarad (autumn) and Hemanta (severe winter). In Ramayana Valmiki has however, interpreted six seasons (Ritu) in India" (Majid Hussain, 1988 : 72). There were however, "five seasons in vogue in the Upanisadic times. The hemanta and sisira seasons were merged into a single one (Aitareya Brahmana, 2.1), as in the Panjab and the North Ganga plain wherein the commencement of the winter it is so cold that it is not easy to mark out distinctly these two seasons" (Tamaskar, 1988 : 55).

4.1.11 Earth's Crust

The Upanisads also give us information about the composition of the earth's crust revealing that it is "made of asma (Chandogyopanisad 1.2.8), pasana and sila (Mahopanisad, 5.47), denoting their compact, hard and
resistant character as against the uncemented, soft and loose categories of the constituents, namely lostha (clay), baluka (sand), mrdapinda (lump of soil), etc. (Chandogyopanisad 1.27 ; 6.1.4) and pebbles (Sarkara)" (Tamaskar, 1988 : 56).

4.1.12 Sun and the Moon

The sun has been described as a self-illuminous body, while moon derives its light from the sun. "The movement of the sun is reflected in the terms Uttarayana (north-word shift) and daksinayana (Southword Shift) in Satapatha Brahmana (1.1.2 ; 6.5.3)" (Tamaskar, 1988 : 54).

4.1.13 Eclipses

During the ancient times the Indian scholars knew the causes and frequency of occurrences of eclipses, because they used to perform some ceremonies on these days. The Aryans considered the eclipses as prediction of some disaster. It was also believed that if lunar and solar eclipses occur in the same month, it was taken as indication of more disastrous future.

Upanisads use symbolic language to explain the lunar and solar eclipses as "when through the ida prana reaches the point of kundalini, the lunar eclipse is caused. But when prana touches the kundalini through pingala, solar eclipse occurs" (Tamaskar, 1988 : 54).
4.1.14 Continents

Like peoples of other civilizations, Indians also explored the unknown parts of the world. The word 'Dwipa' has been used for continents. It is equally applicable to island and peninsula. The world was divided into seven Dwipas: Jambu Dwipa, Kusa Dwipa, Puskara Dwipa, Salmala Dwipa, Kraunca Dwipa, Plaska Dwipa, Saka Dwipa.

4.1.15 Concept of Bharat Varsa

Quoting S.M. Ali, Majid Hussain (1990: 77-78) identifies Bharat Varsa with the Indian Sub-continent and Sapta-Saindhava was the name given to the Punjab Plains by Vedic Aryans. "The word 'Ind' or 'Indu' (Hindu) was applied by Darius and Herodotus to the Indus Valley of the upper gangetic region with which they were acquainted. It is only in or about the 4th Century B.C. that katyayna and Magesthenes gave an account of approximately the whole country down to the Padya region in the extreme south". In the Puranic literature the entire country from Himalayas to Kanya Kumari (Cape Comorin) is designated by the single name - Bharatvarsa (India). The etymological, meaning of the world 'Bharat-varsa' gives a clear conception of the Aryans, regarding its various characteristics and the historical significance symbolising a fundamental unity which was certainly perceived, and understood by those who coined the term Bharat Varsa, derived from Bharata, a sovereign king.
4.1.16 Mountains and Rivers


Different drainage systems have also been described like, Rigveda has mentioned the rivers Ganga, Yamuna, Saraswati, Sutudri (Sutlej), Parusni (Ravi), Asikni (Chenab), Vitasta (Jhelum), Arjikiya (Upper Part of Indus), Susoma (Savan), Sindhu (Indus), Kubha (Kabul), Gomati (Gomala), Krumu (Kurrum). There are references of the Indus drainage system, Narmada, Tapti (Tapi), Godavari, Krishna, Kaveri and Tungbhadra. About the Ganga and the Brahmaputra rivers there are elaborate descriptions.

Besides these sources of information about ancient Indian geographical thought, when Alexander the Great came to India from Hindukush side In 327 B.C. He brought back to the Greek world a thorough account of description of India-rich source of information about the then Indian scholarship.

4.2 Middle Ages

4.2.1 Arabian Scholars

More information came into light in the middle ages
when Arabian scholars came to India and learnt the Indian system of Astrology, Mathematics, Astronomy, etc. One of these scholars was Al-Masudi who visited India in the 10th Century. He found windmills in the desert of Western India and introduced to the Arabian world the wind as a source of energy. Another very important contribution was made by Al-Biruni who wrote a book on Indian geographical concepts. He was invited by Mahmud Ghaznavi to study and to initiate the Indian doctrines to the Muslims. He learnt sanskrit and translated some of the sanskrit treatises into Arabic and, while staying in India, he wrote *Kitab-al-Hind* in 1030. In this book he recognises the significance of rounded stones, he found in the alluvial deposits south of the Himalaya. The stones became rounded, he points out, as they were rolled along the torrential mountain streams.

In *Kitab-al-Hind*, he described the Indian geographical thought. He said that at that time Indian scholars determined the cardinal points in relation to four cities. These four cities were Yamakota in the East, Lanka in the South, Romeka in the West, and Siddhapur in the North. The mountain of Meru, they considered as situated at the North Pole around which the stars turn. About the 'Prime-Meridian' he said that Indians take the meridian of Ujjain as the Prime-Meridian (Majid Hussain, 1990 : 92). He also gave an idea that Indians reckoned days, months and years. He showed that agricultural operations and outputs
of crops depended on the success of summer monsoons. He also described physical structure, cultural landscape, the socio-economic institutions, and various rivers systems of India. His another work on India is Tarikhul-Hind. Ibn-Battuta, another Arab traveller, who came to India in 14th Century during the rule of Muhammad-Bin-Tughlaq (1325-1351 A.D.), travelled widely in India.

4.2.2 Chinese Travellers

Another source of information of Indian geographical thought in the middle ages is the accounts by Chinese visitors to India whose records are carefully recorded and complete one. Buddhist monk Hsuan-Tsang, reached India in the 7th century A.D. After studying in the various centres of Buddhist faith for several years, he returned to China with a large collection of Buddhist relics and manuscripts. He was chinese discoverer of India. In the same century another Buddhist monk I-Ching reached India by sea, and brought back to his country as much as 10,000 rolls of Sanskrit manuscripts and Buddhist texts for translation into Chinese. Both of these travellers made very careful records of their travellings.

Vasco-da-Gama reached India in 1498 and thereafter in the 17th century, British Colonialists came to India with them came slavery, which proved to be a great hindrance in the development of geographic thought. However, for their own benefit and convenience many land surveys and census
were carried out by the Britishers.

Emergence of Geography in Indian Universities was rather late as compared to Western countries. In this context James and Martin (1981: 265) discuss:

"study of Geography at university level appeared late in India. "The first college level teaching was introduced at Aligarh Muslim University in 1931 Where I.R. Khan, who was trained at the University of London, offered courses primarily for teachers. A teacher-training course was also set up at Madras in 1932 as a result of the efforts of N. Subrahmaniam. During the 1930's, when Geography was required in all the high schools, the demand for teacher-training programs resulted in numerous one year courses in many universities; but the staffing of these universities with scholars competent to offer post graduate work, was delayed for many years. The first independent department offering graduate work were at Aligarh in 1936, Calcutta in 1941 and Madras in 1948. By 1965, there were twenty-two universities with separate Geography departments".

4.3 Geographical Trends in India: Recent and Recent Past

As in other parts of the world Geography has been changing its theme and place in the universe of knowledge, because any discipline which solves successfully, the contemporary problems of society gains an important place in society and universe of subjects. A brief mention about the Indian Geographic thought in the recent past as also the recent trends follows:

4.3.1 Status in School Education

Though Geography has always been an important subject in school curriculum in India. But not much attention has
been given to it teaching in India as highlighted by Misra (1983:3):

"Since 1950, Geography has been losing ground in school curricula. It has been submerged in an amorphous discipline called Social Studies which combines Geography, history, sociology, economics, political science etc. This combined subject can now be taught by each and every teacher. There is no special knowledge and training required for it. While in principle it is a good idea to give an integrated picture of social processes, in practice it turns out to be most disintegrated.... This way Geography is the main sufferer, for it is difficult for a non-geography teachers to teach the subject. And it so happens that a majority of social studies teachers are non-geographers".

So the underlying concept of social studies should be thoroughly reviewed, and due consideration should be given to limitations.

4.3.2 Status in University Education

Geography expanded fast in the university education system. In 1950, the number of universities which had Geography departments were only four (Calcutta, Madras, Delhi and Bombay) while, in 1981, there was hardly any university which died not have a department of Geography. Besides this, another contribution by Indian geographers which boosted the reputation of geographers and Geography in India, was establishment of institutions, not coming under the preview of Geography, but are founded and led by geographers. These institutions at the national level are the Centre for the Study of Regional Development, Jawahar
Lal Nehru University, and Institute of Development Studies, University of Mysore. Some old departments were also re-activated during 1970's like that of Madras, Poona, Utkal and Garhwal Universities.

Training in Geography in India, however, is not as rigorous and systematic as it should be. Though Geography attracts a large number of students, but the quality is not so high. This leads to downgrading of teaching further because from these students teachers come. Another factor which has affected the Geography at university level is regionalisation and localization of universities (Misra, 1983 : 4-5).

Inspite of all these challenges, a number of university departments and institutions are engaged in geographic training and research and have given the subject a new content and prestige.

4.3.3 Research Trends

As research is a must for the survival, development and progress of any discipline a recent aspect of indian geographic research is the identification of service centres in rural areas also.

There is a "fairly good amount of research which has broken new grounds. Somehow it has largely been in the fields of Regional Geography, regional planning and regional development. Equally, good work has been done in the fields of Geomorphology and Climatology at Waltaire, Poona and
Calcutta. Some of the areas which offer good scope for research are locational analysis, area planning, resource analysis and urban rural transformation on the social side of the spectrum; and land valuation, land capability; and agroclimatology, on the physical side of the spectrum" (Misra, 1983: 6).

The ICSSR has published the 'Survey Report in Geography (1972)' and its other reports which aim at bringing the stocktaking of geographic research up to date, comes out regularly. A study of these reports, major Indian geographical journals, published monographs and some Ph.D theses indicate the prevailing trends as far as themes in geographical research are concerned. As explained by Deshpande (1983: 12):

"Subfields have proliferated. Initially it was the land use studies after the L. Dudley stamp that attracted our attention. This was followed by 'Urban Geography'. With the advent of national economic planning, regional planning, and not-so-much regional Geography, engaged a considerable attention.... Geography of tourism is catching interest.... A rough guess is that there have been many contributions especially in geomorphology and climatology, particularly by climatologists. Biogeography has not yet claimed significant attention, though there is rising interest in natural environment and ecology".

Themes in ongoing research is of repetitive and unchallenging nature. The choice of themes is clearly influenced by the prevailing interests in western countries. This is true about methodology and techniques being adopted
by the Indian geographers. We can take ideas from our western counterparts but keeping in mind the needs in Indian context (Despande, 1983: 12).

Another development in the current research trends is focus on Regional Economics and Regional Planning though major part of this ground has already been covered by economists.

Emphasizing the need to relate the Modern Indian Geography to the problem of life, Despande (1983: 13-4) suggests advances in two directions:

"it is possible to make an advance in two directions: make the already existing subfields strongly problem oriented, and search for the gaps that need to be filled up. In the first case, it is necessary to correct the present imbalance, sub-fieldwise in favour of the 'physical side'... In the second category, there appear to be many gaps that need our attention. On the physical side, there is hardly much that has been done by geographers in the subfields of ecological and environmental studies as well as studies in resources and their conservation. So is the case of Medical Geography which spans over both the physical and human aspects. Identification of traditional cultural regions, social cores, patterns of their spatial expansion and contraction, spatial patterns of religions of languages, including regional dialects and behavioural patterns of social and economic groups in space hold an exciting prospect... In sum, they might say, that ends of the telescope needs to be reversed and we try to identify the problems in real life first and then apply suitable methodology and techniques, rather than the other way round. It would be possible, then to make a viable contribution to the solution of our social and economic problems and also to the approaches of theory building in Geography as a science".

122
5. **GEOGRAPHIC INFORMATION : ROLE OF ICSSR AND NASSDOC**

As the speed and scope of research increases in any specific area, the need for an institution which can support it is felt automatically. So, for the development of any subject, the first step should be establishment of a central agency, which can provide research directions, financial aid, information control and utilization of research results. For the development of social science information, the main supporting agency has been ICSSR and its organ NASSDOC. But there are also other institutions for the development of the subject.

5.1 **ICSSR**

The ICSSR was set up in 1969 as an autonomous organisation under the Ministry of Education of Government of India. Its primary role which is to promote research in the Social Sciences in the country is accomplished through many schemes, meant for building up infrastructure of research, providing maintenance and development grants to research institutions, financing research projects, awarding research fellowships, providing grants to meet research expenditure, assisting in training programmes etc. The research thread is woven to facilitate theoretical studies in social sciences (the development of social sciences theory), refinement of methodology and better understanding and solution of the important national problems (Aggarwal and Manohar Lal, 1990 : 78).
ICSSR aims at strengthening and expanding the research base, improve its quality, and strive for its better utilization in policy formulation. Besides, it provides facilities for documentation and bibliographical services for research scholars in the field of social sciences, covering disciplines like economics, education, history, public administration, sociology, social and cultural anthropology, international relations, and all other subjects of interdisciplinary nature, including Geography. Aggarwal and Manohar Lal (1990 : 81) summarises these objectives as:

1. "To inform scholars about the material available, current and retrospective in his/her research fields;
2. To assist scholars in the procurement of research material;
3. To strive for bibliographical control of research material;
4. To assist research institutions in creating documentation and bibliographical services;
5. To maintain linkage with other documentation and information centres;
6. To bridge the gap between professional and information technology".

5.2 NASSDOC

The National Social Sciences Documentation Centre (NASSDOC) is the focal point of ICSSR which provides policy guidelines. Its Committee on Documentation Services and Research Information consists of 14 leading social
scientists, librarians, and information scientists. The Director, NASSDOC is assisted by a team of 100 staff members, looking after various documentation and information activities.

5.2.1 Activities

Aggarwal and Manohar Lal (1990 : 81-82) have enumerated the following principle activities of NASSDOC:

1. "Building up a collection of reference materials and works on research methodology;

2. Providing bibliographical information about Indian publications in social science disciplines to international documentation agencies;

3. Striving for bibliographic control over social science materials by bringing out various documents under 'Research Information Series';

4. Providing select bibliographies on request;

5. Providing micrographic and reprographic services;

6. Providing document supply services to scholars from outside Delhi;

7. Awarding study grants to scholars for working at libraries of their interest in India;

8. Providing consultancy to social sciences institutions in setting up documentation and information centres;

9. Providing facilities to its staff for participation in professional seminars and conferences through contributing papers and taking active part in their deliberations, deputing staff to attend short refresher courses;

10. Conducting professional training courses under continuing education programme;
11. Processing project proposals involving financial assistance to documentation and bibliographical projects for consideration by ICSSR Committee on Documentation Services and Research Information;

12. Maintaining linkages with national and international data centres and libraries;

13. Entering into agreement with national and international organisations for mutual exchange of publications, participating in book exhibitions, undertaking sale of Govt. of India publications to research institutes;


5.2.2 NASSDOC Social Sciences Collection

The NASSDOC Social Sciences collection including Geography comprises of:

(a) Unpublished doctoral theses approved by Indian universities and foreign theses on India; (b) research reports of the projects undertaken by ICSSR and other social science research institutions assisted by ICSSR; (c) working papers presented at ICSSR funded seminars and conferences, and (d) periodicals of research value in social sciences.

5.2.2.1 Periodical Literature

Backfiles of about 100,000 volumes of periodicals are maintained while the current issues of most of the Indian Social Sciences periodicals are regularly received.
5.2.2.2 Reference Sources

The NASSDOC library maintains a good collection of reference sources in social sciences, including encyclopaedias, subject dictionaries, bibliographies, indexes, abstracts, etc.

5.2.2.3 Theses and Research Reports

Library has got a collection of unpublished doctoral theses in social sciences accepted by Indian universities and also those of foreign unpublished theses on India.

5.2.2.4 Documents in Microforms

Due to the space problem, back files of journals, Ph.D. theses, research project reports, and ICSSR publications like annual reports, newsletter, brochures and some of the periodicals, etc. are now being maintained in microform. The centre has also started acquiring the documents in machine-readable form such as floppies, discs, tapes etc.

5.2.3 Inter-Library Resource Centre

Inter-Library Resource Centre (ILRC) was set up in 1975, and invited the local libraries to deposit their non-current, infrequently used, but important serials for research. 38 libraries of Delhi have since deposited their periodicals and Serials at the Centre.
5.2.4 International and Regional Cooperation

5.2.4.1 International


It also assists the UNESCO DARE data bank by providing up-to-date information about research institutions, journals and research projects, completed and in progress, in the field of social sciences in India.

5.2.4.2 Regional

NASSDOC participates in the UNESCO Regional meetings of experts. NASSDOC is the national focal point for the Asia-Pacific Information Network in Social Sciences (APINESS) network and coordinates as well as promotes its activities. The centre has also undertaken project for UNESCO under APINESS programme.

5.2.5 Continuing Education Programmes

NASSDOC undertakes library courses leading to Associateship in Library and Information Studies in Social Sciences and also short term courses on various topics of current interest.
5.2.6 Consultancy Services

NASSDOC also provides consultancy services to institutions regarding planning for library documentation and information services.

5.2.7 Automated Services

It is planning to computerise research materials and reference materials in social sciences available in libraries in India. Bibliographic data of the document 'Union List of Current Social Sciences Periodicals' has already been put on floppies.

5.2.8 Research Projects Data Base

It is to provide a data base of research projects in social sciences, completed and in progress, to avoid duplication, and for judicious utilisation of resources.

5.2.9 SDI Services

The compilation of interest profiles of scholars so as to provide selective dissemination of information service is being initiated.

5.2.10 Resource Sharing

It is planned to conserve resources and to put them to better use.

5.2.11 Micro-filming of Research Material

Microfilming of theses, project reports and journals is contemplated to cope with space shortage and preservation
problems.

5.2.12 Documentation Programmes

NASSDOC Documentation Programme can be grouped under three heads as:

(a) Direct Programmes: NASSDOC Research Information Series includes:

1. Union list of Social Science periodicals.
2. Union catalogue of Social Science serials.
3. Inventory of Social Sciences Institutions and Organisations in India.
4. Retrospective cumulative index of Indian Social Science periodicals.
5. Area studies bibliographies.

(b) Assisted Projects:

1. Documentation assistance.
2. Publication assistance.
3. Financial assistance to libraries.
4. Study grants.

5.3 ICSSR PUBLICATIONS

Publications of the ICSSR can be described under the following heads:

1. State-of-the-art-Reports: ICSSR brings out periodically survey reports in the various social sciences.
Abstracting Journals: ICSSR has been publishing various abstracting journals on social science subjects, including: ICSSR Journal of Abstracts & Reviews: Geography (1975 - ).

Serials: There are also eleven serial titles giving information about its various activities, services, and programmes like Acquisition, Current Awareness Service, Bibliographical Service, Indexing Service and Resource Sharing. These are:

1. Acquisition Update (Monthly)
2. APINESS Newsletter (Quarterly)
3. Bibliographies on Tape (Irregular)
4. Conference Alert (Quarterly)
5. Indian Diary of Events (Quarterly)
6. NASSDOC Dockets (Monthly)
7. Paging Periodicals (Bi-Monthly)
8. Samajik Vigyan Samachar (Monthly)
9. Social Sciences News (Monthly)
10. Social Sciences Research Index (Irregular)
11. Bibliographic Reprints (Irregular)

NASSDOC Adhoc Publications: A number of adhoc publications nearing 100 have also been brought out by the NASSDOC.
5.4 Regional Centres

In addition to NASSDOC, the ICSSR has created a network of regional centres for easy transmission of knowledge being generated by researches and studies. Each of the six regional centres in the country have its jurisdiction over a cluster of states. In the field of documentation services, Regional Centres undertake the following activities:

1. Promote and/or sponsor documentation and bibliographical work in the regional languages.
2. Promote/Undertake special documentation projects.
3. Supplement the collections of social sciences journals/periodicals at the libraries of the institutions where the centres are located and to;
4. Provide photocopying facilities in regard to selected articles from journals. Some of the Regional Centres have been able to build fairly good infrastructural facilities that include library and documentation facilities. These are also expected to be repository of social doctoral theses and research reports in their respective regional languages and are also required to undertake translation of important sources of information (Aggarwal and Manohar Lal, 1990 : 86).

The regional centres are functioning at the following places:

132
5.5 National Information System

A national information grid has been discussed by the ICSSR Planning Board. This system will link centres of social science activities in the country and provide efficient service to the seekers of information. NASSDOC is expected to play central role in the set-up.

5.6 Publication Programmes

Social Scientists in India cannot think of carrying out research without the information support of ICSSR. It helps the social scientists through various services and strives to serve their specialised information needs. Geographers also get most of the needed information out of ICSSR publications and through it's seminars, conferences, consultancy services, etc.

5.6.1 Categorization

ICSSR/NASSDOC publish a number of documents. These can be grouped into two categories, in the context of present study, i.e.
(1) Publications pertaining to Geography only; and
(2) Publications covering Social Sciences in general
(including Geography as a part of Social Sciences).

Though the ICSSR/NASSDOC also publish publications covering other discipline than Geography individually.

The publications of ICSSR can be further categorised as:

Publications through Direct Programme

(i) Union catalogue publications programme.
(ii) Area study bibliographies.
(iii) Inventory of Social Sciences Institutions and Organisations in India.
(iv) Retrospective cumulative Index of Indian Social Science periodicals.

Publications through Indirect Programmes

(i) Grants in-aid-schemes
   (a) Current documentation projects.
   (b) Bibliographical and Documentation projects, sponsored by ICSSR.
   (c) ICSSR, research projects.

Publications for Information Dissemination

(i) State-of-the-art-reports
Publications through Direct Programmes

(i) **Union Catalogue of Social Science Periodicals Series**
The compilation of this union catalogue was the first major project undertaken by ICSSR. Thirty two volumes giving location of about 31,125 serials and periodicals in 17 states and two Union Territories, including a separate volume on National Library, Calcutta were published. The Union Catalogue helps to locate a recognised volume of social science periodicals/serial if it is available in any of the participating libraries. The project has been revived for updating.

(ii) **Union list of Social Science Periodicals**
Four volumes of the Union lists relating to periodicals currently available in Andhra Pradesh, Bombay, Delhi and Karnataka libraries were brought out in 1970-71. The Delhi list had been updated in 1978, 1982 and 1985. These lists are being continually updated with the help of micro-computers. Similar lists are planned to be brought out from other cities as well. The first to come out has been from Lucknow.
(iii) Area Study Bibliographies

Started during 1979, the Area Study Project aims at bringing all social sciences material of research value excluding articles pertaining to different states and Union Territories of India. This project is intended to bring out series of bibliographies which will cover material in social sciences available in any form and language exclusively related to the area concerned. The compilation work has been completed for Andaman & Nicobar Islands, Goa Daman & Diu, Madhya Pradesh, Haryana, Himachal Pradesh, Rajasthan, Tamil Nadu, and U.P. and is in progress in the remaining states and Union Territories.

(iv) Inventory of Social Science Institutions and Organisations in India

It contains addresses of over 1000 institutions and was brought out in 1985. Prior to this, Directory of Social Science Research Institutions in India and Directory of Professional Organisations of Social Scientists were compiled in 1971-72. After that a Directory of Social Science Research Institutions and Organisations was compiled as part of the ICSSR project. In 1987 NASSDOC Source Book of Institutions was brought out. It also provides information about directions of research institutions.
Indexing of journals in Education, Psychology, Anthropology and Sociology has since been accomplished. The project, on completion, will provide bibliographical control of periodical literature of potential utility to Social Scientists published over the past hundred years or so.

5.6.1.2 Publications through Indirect Programmes

(i) Grants-in-aid-schemes

This category covers programmes related to ICSSR-assisted projects and includes preparation of indexes and bibliographies, such as:

(a) Current Documentation Projects
- Annotated bibliography of Kannada reference sources.
- Annotated guide to reference sources in Telugu.
- Encyclopaedia of Social Sciences in Hindi-Preliminary Survey.
- Encyclopaedia of Social Sciences in Marathi.

(b) Bibliographical and Documentation projects, sponsored by ICSSR
- Association of Indian universities, New Delhi. Preparation of Doctoral awards by the Indian Universities in Social Sciences
Indira Gandhi Open University, New Delhi. Annotated guide to reference sources in Telugu.

Institute of Economic Growth, Delhi. Preparation of Asian Social Science bibliography.

Karnataka University, Department of Library Sciences, Dharward. Preparation of Annotated bibliography of Kannada reference sources in Social Sciences.

Lucknow University, Department of Library Science, Lucknow. Compilation of Union list of Periodicals in Social Sciences in Lucknow.


Samaj Vidnayan Mandal, Pune. Preparation of Encyclopaedia of Social Sciences in Marathi.

United Service Institute of India, New Delhi. Compilation of Union Catalogue of Rare Books in Social Sciences Published in 16th Century and onwards.

(c) ICSSR Research Projects

5.6.1.3 Publications for Information Dissemination

(i) State-of-the-art-reports

ICSSR brings out periodically survey reports in various disciplines of social sciences. Several volumes have been brought out under the series. As far as Geography
is concerned, the publications are:

- State of the Art Report on Social Sciences Research Trends in India. ICSSR.

(ii) Abstracting Journals

ICSSR has been publishing the following abstracting journals, useful for geographers:

- ICSSR Journal of Abstracts and Reviews: Geography
  This service was initiated in 1975, published twice a year. Each issue contains abstracts of selected articles from allied disciplines, periodicals, and review of books monographs and reports. An author and regional index of paper abstracted is also provided.

- ICSSR Research Abstracts Quarterly
  Published four times a year, since 1971. Abstracts
reports of research projects funded by the ICSSR in Social Sciences. A cumulative index entitled ICSSR Research Abstracts Index, Vol. 1-II, 1971-82, was brought out in 1986.

Indian Dissertation Abstracts
Started in 1973, it is published four times a year. It is jointly sponsored by the ICSSR and the Association of Indian Universities (AIU). Each issue publishes short summary/synopsis of Ph.D thesis in Social Sciences submitted to Indian Universities. A cumulative index entitled Indian Dissertation Abstracts Index, Vol. 1-10, 1973-81, was brought out in 1986.

(iii) NASSDOC Serials

(iv) Ad-hoc Publications
About one hundred ad-hoc publications have also been brought out by NASSDOC. These can be broadly categorised as: Research material in NASSDOC and other institution, directories, indexing and bibliographical documents under the NASSDOC Research Information Series.

5.6.1.4 Publications by ICSSR Regional Centres
ICSSR Regional centres also contribute by its six regional centres through documents pertaining to their jurisdiction. Not only this, some of the regional centres
in collaboration with some universities have been publishing high quality documents, e.g. ICSSR North Regional Centre, New Delhi with collaboration with Jawaharlal Nehru University Library has been bringing out a regular indexing service, regular and occasional bibliographies and particularly in the Development Information Network on South Asia (DEVINSA) Network. This library is also publishing since 1980. Suchika, a monthly service indexing nearly 400 Indian and 1100 foreign journals received in the Library. Prior to Suchika, it had brought out Annual Index of Serial literature, indexed from 1972 to 1975, under the title Periodical literature on Social Sciences and Area Studies. The library is one of the active participants and National Focal Point in the DEVINSA, a project conceived in 1981 by six South Asian Countries to provide information on current development activities and socio-economic research in the countries of south through dissemination and document delivery and thereby help, avoid or reduce duplication of research. The major products of DEVINSA project are:

DEVINSA Monthly Bibliography, DEVINSA Annual Bibliography, DEVINSA Abstract Quarterly and DEVINSA Abstract Annual.

Likewise, the ICSSR Southern Regional Centre, Hyderabad, established in Feb. 1973, is one of the most active centres among the regional centres. The centre has been bringing out a Social Science Information Bulletin in mimeographed form since 1981, providing information on South
India regarding (i) Seminars, Workshops, Symposia and Courses; (ii) Completed research projects in South Indian Universities and Research Institutions; (iii) Ph.D. and M.Phil degrees awarded by South India in Social Sciences. In addition to the regular documentation, it has brought out a number of regular and occasional bibliographical compilations on topics of current interest. It is Union List of Current Social Science Periodicals covering serials available in important libraries in the city of Hyderabad. It is also indexing and bringing out a list entitled Articles from Current Malaayalam Newspapers and Periodicals. One of the important activities of the centre is the periodical compilation of current M.Phil and Ph.D. programmes in Social Sciences in South Indian Universities in collaboration with the Madras Institute of Development Studies. As a part of its documentation activities, it has been bringing out:

- **Documentation in Social Sciences.** English Bi-monthly. 1978-

- **Current Contents in Social Sciences.** English Monthly.

- **List of Select Articles from Telugu Newspapers and Journals.** Half Yearly. 1978-

- **List of Select Articles from Urdu Newspapers and Journals.** Half Yearly. 1978-
- List of Select Articles from Kannada Newspapers and Journals. Half Yearly.

- Index of Current Articles from Malaayalam Journals.

In addition to the regular documentation, it has brought out a number of regular and occasional bibliographical compilation on topics of current interest, such as:

- List of Telugu works on Andhra Pradesh available in major libraries in Andhra Pradesh 1978. 488 references (Mimeographed).


- Bibliography on Population Education.

The ICSSR North Eastern Regional Centre, Shillong maintains a Register of Social Scientists and Social Science activities of the region. The centre has brought out NEHUNERC Documentation Bulletin since 1981. Which indexes social sciences journals received in the centre. It has also compiled a Consolidated list of Journals available in some eminent libraries of North-East India during 1988. NERC has also been providing financial support towards publication of Bhogolika an Assamese Journal of the North
East India Geographical Society. Some of the publications, brought out in collaboration with Northern Eastern University are as:

- Social Science research on North East India - A select bibliography. 1979-


The ICSSR Eastern Regional Centre at Calcutta has taken up NASSDOC sponsored project of compiling Area Study Bibliographies.

The ICSSR North Western Regional Centre, Chandigarh, located in the Panjab University Library is preparing on a continuing basis, Cumulative index of Social Sciences books in Panjabi language and Social Sciences materials in Punjabi Periodicals since 1982. It has also compiled:

- List of holding of journals in Social Sciences available in Panjab University Library.

- Bibliography of Ph.D. and M.Phil Thesis in Social Sciences approved by Punjab Agricultural University, Ludhiana.

- Union list of periodicals in libraries in Chandigarh.

144
- List of Social Science Periodicals available in Nehru Library of Haryana Agricultural University, Hissar.

- 14 lists of articles which have appeared in journals being received by the Regional Centre, 1984-85.

- Bibliography of Ph.D. dissertation accepted in region in the field of Social Sciences (continuing).

5.6.2 International and Regional level linkage

The ICSSR has been participating in a number of regional and international activities including NASSDOC’s provision of data regarding Indian publication for International Geographical Bibliography published from Paris. It also assisted UNESCO DARE Data Bank to update data about research institutions, journals and research projects, completed and in-progress in the field of Social Sciences in India. At the regional level, NASSDOC is the National Contact Point for the network under the APIINESS programme. It has also undertaken projects assigned by the UNESCO, such as:

- India 2000: An Annotated Bibliography
- Selective Inventory of Information Services
- Collecting data from Asia-Pacific region for World Directory of Social Science Institutions.
An extensive listing of ICSSR publications helpful in geographical information has been included in the chapter on Geographic Reference Sources.

6. **RECENT TRENDS OF GEOGRAPHIC THOUGHT: A GLOBAL PERSPECTIVE**

Like any other science, Geography has inevitable relationship with the needs of the society. Just as society's needs have changed over time, the professional perspective and emphasis in the field have also changing whenever geographers failed to be relevant to the society's dominant needs, the discipline was relegated to a back seat (Dikshit, 1984: 1).

If we observe the changing trends of geographic thought and ideas right from the ancient times, we can put together the historical development in three phases. These phases are:

1. 1st Phase (until 1850 - )
2. IIInd Phase (1850-1950)
3. IIIrd Phase (1950 - )

1st Phase (until 1850)

This period is extended over thousands of years from
the early Greeks to the 1850's. This was the period when there were no separate discipline as we have today and is known as classical period of scholarship. During this period a scholar could master a number of areas. That is why many Greek Philosophers listed as historians of that period can judiciously be called as geographers too.

Until around 1800 A.D., the main areas of focus before geographers, were to develop methods or techniques for recording absolute locations, improvement in map projections and the associated task of compiling and revising maps. So, the advancement of Geography was more or less synonymous with the development of Cartography. Around 1800, however, the focus shifted to the problems in recording what places (now accurately located) are like and how far one place is similar to similar to or different from another. Ritter and Humboldt provided models for such studies and were turning point in the direction of Modern Geography.

IIInd Phase (1850-1950 A.D.)

After the death of Humboldt and Ritter in 1869, the Classical Geography came to an end, as no individual scholar could claim any longer to master the world’s knowledge about the earth. The specialization of the subject matter led to division of Geography into various fields. But none of them covered the Humboldt's and Ritter's regional studies which have the interconnections among things of diverse origin that gave harmony to places on the earth's surface.
Result of disintegration of Geography on the other hand was loss of its place as mother of various sciences. It was only in 1874 that Geography emerged as university discipline in Germany. Ritter’s chair of Berlin was given to Ferdinand Richthofen in 1875. But this sudden prominence given to Geography was led by realization for the need of trained geographers "with a view to inculcating large space-consciousness among her people as well as to meet the growing demand of the Empire for knowledge about new areas and places around the world so necessary in that competitive world of contemporary imperialism" (Dikshit, 1984 : 3).

Similar was the case with France where development of Geography as an academic field clearly showed the country’s interest for Colonial expansion. Likewise, Mackinder, who was first to occupy the chair of Geography in England in 1887, concentrated on Britain’s imperial interest as a world power. Ratzel’s Social Darwinstic ideas leading to a organismic state also appear as a clear answer to his country’s urge for imperialistic expansion (Dikshit, 1994:3).

Another important reason which lent encouragement to studies in Geography was in shaping the feeling of nationalism, because in the development of the feeling of nationality, detailed knowledge of the history and Geography of one’s own country was indispensable (Dikshit, 1984 : 3).

As far as geographical themes prevailing at that time are concerned, Geography was left with three areas to
concentrate upon. As Dikshit (1984 : 4) explains, "after the separation of different topical discipline from Geography in the beginning of the 19th century, and with the acceptance of Chorology as the dominant paradigm of Geography, our discipline was left with three major tasks: exploration of unknown regions; in-depth study of particular places (that besides advancing frontiers of knowledge, was primarily of value to governments, businessmen and colonizers in that age of expanding colonialism); and seeking generalizations from the specific case studies of the first two types".

By the beginning of the 20th century, Geography lost its place of importance as compared to Social and Psychological sciences, because the needs of the state in capitalistic system had changed.

IIIrd Phase (1950 - )

Until after the second world war, Geography was relegated to back seat but around 1950 Geography experienced a new revolution. Throughout 1950's and 1960's major areas of concentration were location theory and pattern and process of behaviour in space. Now spatial theory, psychology, and quantitative methods were brought together, because of new situation created by prosperity in U.S.A. and reconstruction in Europe as aftereffects of second world war; so Geography gained respectability and field of
scientific enquiry. These revolutionary shift in geographic studies is analysed by Dikshit (1984:6) as:

"During the 1950’s another important development was rapid improvement in computer technology and the availability of increasingly sophisticated electronic computers, the stage had been set for a cumulatively complex analysis of economic data. Accordingly one of the fundamental aspects of the post-1950 ‘new Geography’ was increasingly rigorous use of quantitative techniques of spatial analysis.... it created dynamism, self-assurance and sense of purpose that had been absent in geographical work previously. It turned our largely introspective discipline into one that was outward looking and actively concerned with reassessing its relationships with the other fields of scientific inquiry."

Though quantitative revolution helped to provide order, but it was concentrating on method rather than substance of geographical research. Consequently, instead of concern with theoretical issues involved in problems related to the exploration of social reality, sophistication in the measurement and description became the area of concentration. So this quantitative - spatial - behavioural approach also had serious problems as Dikshit (1984:6) highlights:

"First, there was a marked tendency toward making collection of data and use of various techniques of classification, measurement, prediction and so on as the central objective of research. This contributed to divert attention away from social relality.... variables were torn out of the context and analyzed in isolation from reality of which they are part.... secondly, while conceding that the identification of patterns is but a step in the search for process that have generated
those patterns, geographers continued to concentrate upon description and measurement of geometrical forms almost completely neglecting explanation of the underlying processes that lie embedded in history and social structure. Thirdly, by the very nature of our discipline, geographers often adopt theories and models from the cognate social science. During the era of the quantitative revolution this borrowing of theory went on without critical appreciation of their validity and relevance to real life situation".

This neglect of sociological aspects was due to geographer’s interest to became scientists. Kant also said that the science now demand knowledge only of phenomena (i.e., quantitatively measured objects) ethics, morality (Dikshit, 1984 : 7). Consequently, Geography started treating man as phenomenon i.e. naturalised, away from social realities.

However, around 1960’s, the trend changed as many young geographers made serious studies in then prevailing concepts and questioned the accepted paradigms of the quantitative - analytical tradition and there was a change away from scientific rationality with an awareness towards humanistic concerns which brought-together social science and man and established and understanding, wisdom, objectivity (Dikshit, 1984 : 7).

"In the middle of the 1960’s, two streams of thoughts dominated the Human Geography : one, the old school using traditional descriptive methods : and the second, the mainstream, that was based on the concept of Geography as spatial interaction and concentration on location theory,
quantification and behaviourism" (Dikshit, 1984 : 8).

After the Vietnam war, there was inclination towards social problems, relevance in research, participation in public policy formulation, urban and regional poverty, distributional social services, etc.

"From 1972 onwards, the more radical and action-oriented geographers of the social relevance group changed their disciplinary emphasis from the general attempt to engage the discipline in socially significant research to an attempt to construct a radical, philosophical and theoretical base for Geography" (Dikshit, 1984 : 9). Thus, as the "relevance" revolution progressed, it got divided into two separate groups of "liberal" and "radicals". The former label is given to those who believe in new synthesis of geographical theory, more relevant to problems faced by the society. Radical on the other hand, showed inclination for an entirely new structure of philosophy and theory in Geography. Significant developments during the 1970's and 1980's may be summarised as: (i) new ways of tackling old problems; (ii) developments in area sampling and data gathering; (iii) multivariate analysis and adaptations of inferential and descriptive statistical methods; (iv) developments in formal spatial models at theoretical and applied levels: (a) geometric and graph-theoretic models of transportation networks; (b) geographical application of linear programming models; (c) simulation models and
spatial diffusion; (d) spectral methods and geographical research; (e) geographic approach to general system modelling; (v) behavioural Geography - research on environmental perception and spatial behaviour; and (vi) methodological and mathematical developments that were peculiarly geographical in nature (Gopalakrishan, 1990:83).