SOCIAL SCIENCE

STANDARD VIII

Untouchability is a sin
Untouchability is a crime
Untouchability is a inhuman

TAMILNADU

TEXTBOOK CORPORATION

College Road, Chennai - 600 006

First Edition - 2005
Reprint - 2006

CHAIR PERSONS

HISTORY AND CIVICS

Thiru. B.RAMANATHAN
Lecturer (S.G.) History
Presidency College
Chennai - 600 005.

GEOGRAPHY

Dr. S. RANI SENTHAMARAI
Reader - Geography
Presidency College
Chennai - 600 005.

REVIEWERS

Dr. K. VIJAYA
Lecturer (S.S.)
Department of Historical studies
Quied-e-Milleth Govt.College (W)
Chennai - 600 002.

Thiru. V. TAMILARASAN
Lecturer (S.S.) Geography
Presidency College
Chennai - 600 005.

AUTHORS

Tmt. P.C. BHANUMATHI
P.G. Teacher - History
N.K.T. N. G. H. S. School
Chennai 600 005

Tmt. S.JAYALAKSHMI
B.T. Assistant
Govt. Higher Secondary School
Arumbakkam, Chennai 600 106

Tmt. V. MEENAKSHI
Lecturer - Geograophy
DIET, Kumulur,
Trichi

Tmt. K. SOBANA
P.G. Teacher - Geography
N.K.T. N. G. H. S. School
Triplicane
Chennai 600 005

Thiru. T.S. BAKTHAVATCHALAM
B.T. Assistant
Govt. High School,
Subba Reddy Palayam
Thiruvallore 600 120

Price : Rs.

This book has been prepared by the Directorate of School Education on behalf of the Government of TamilNadu

This book has been printed on 60 G.S.M. paper

Printed by Web-Offset at :

CONTENTS

HISTORY

01.	Coming of Europeans to Tamil Nadu	01
02.	Revolt Of Palayakkars and Vellore Mutiny	11
03.	Economic Condition of TamilNadu Under British	20
04.	Education in TamilNadu Before Independence Role of Christian Missionaries	27
05.	Role of TamilNadu in the Freedom struggle	35
06.	19th and 20th Century Social Reform Movements in TamilNadu	42
07.	Education In TamilNadu After Independence	50
08.	Economic Development In TamilNadu	60
09.	Social Welfare Schemes of TamilNadu Government	72
10.	Development of Literature and Culture in Modern TamilNadu	82

CIVICS

01.	Our National Goals	89
02.	National Integration	99
03.	National Defence System	105
04.	Our Social Problems and Solutions	113
05.	Our Economic Problems	122
06.	Human Rights- Women Rights	131

GEOGRAPHY

	INTRODUCTION	138
01.	Structure of the Earth	139
02.	Earth Movements	146
03.	Volcanoes	158
04.	Earthquakes	173
05.	Rocks	185
06.	Rivers	193
07.	Underground Water	209
08.	Glaciers	222
09.	Ocean Waves	234
10.	Wind	241
11.	The Oceans	250
12.	Typology of Natural Disasters	264
13.	Typology of Human-Made Disasters	289

HISTORY

1.COMING OF EUROPEANS TO TAMILNADU

Learning objectives

1 Acquires knowledge about the arrival of the Europeans.
2 Understands the conflict between the English and the French.
3 Acquires knowledge about the achievements of Robert Clive.

Tamil Nadu, a state of India, is also a land of great culture. It was ruled by many famous kings during the Sangam age. Their contribution to Tamilnadu's culture and civilisation are very significant. The ancient Tamils had trade links with Greeks and the Romans. More over, the Venician traveller, Marco-Polo during the reign of II Pandian Empire visited the then Tamilnadu. He gave a good account about the commercial goods like spices, cotton, silk etc. This encouraged the other Europeans to have trade relations with Tamilnadu.

In 1453, the Turks captured Constantinople and closed the Mediterranian sea route. So the Europeans had to discover a new sea route to Eastern Countries. Dicoveries of 15^{th} and the 16^{th} centuries paved the way for the Europeans to have trade relations with the Eastern countries, particularly with India. Portugal and Spain encouraged their navigators to undertake sea voyages.

1. Coming of the Portuguese:

The Portuguese were first among the Europeans to discover a sea route to India. The king of Portugal, Henry- the navigator encouraged the sailors to undertake the sea voyages. Consequently, a portuguese

sailor,Vasco-da-gama reached Calicut on the western coast of India, in 1498. He was received by Zamorin, the ruler of Calicut. This paved the way for establishing their settlement.


Vasco-da-Gama

The sea route discovered by Vasco-da-gama is a turning point in the history of India

Francisco-de-Almeida (1505-1509) was appointed as the first governor for the Portuguese settlements in India. He wanted to make the portuguese, **the masters of Indian Ocean** . This policy is known as the **"Blue Water Policy"**.

Alfonso de Albuquerque (1509-1515) was appointed as the second governor. He laid the real foundation for the portuguese power in India. In 1510, he captured Goa from the Sultan of Bijapur, which became their headquaters in India.

Growth of the Portuguese: Over the time, the Portuguese obtained trading rights at Nagapattinam from the Sevappa Nayak of Tanjore. A Portuguese fleet arrived in 1533 and occupied the port towns like Nagapattinam, and Tuticorin. Santhome in Chennai was also one of the Portuguese settlements. Madurai Nayak attempted to send the Portuguese away from India, but failed.

Causes for the decline of the Portuguese Power in India:

a. **Portugal was a small country. It could not control a big country like India.**
b. **The Portuguese merchants were rarely honest.**
c. **The Dutch and the English became the strong rivals to the Portuguese in India.**

2. Coming of the Dutch:

The Dutch traders came from Holland. They set up a factory at Devanampatnam in 1608. Towns such as Karaikal, Pulicat and

Nagapattinam on the East coast were captured by them. They also obtained Santhome from the French. They fortified all their settlements. In 1689 Nagapattinam was made the seat of Dutch Government.

Causes for the failure of the Dutch:

a.The Dutch indulged in slave trade and entered into intrigues in the courts. These activities made them unpopular.

b.The Dutch had to yield their position in India to the English because of the British naval supremacy. They developed trading contacts with Indonesia rather than with India.

3. Coming of the English:

The English East India Company obtained Royal Charter from queen Elizabeth on 31st December 1600 to trade with India. In 1639 Francis Dey obtained the site of Madras from the Governor of Chandragiri. For the site the company was to pay a small amount as annual rent.


Fort St.George

In 1640, Fort St.George was built at Madras. It was made the Headquarters of English in the East.In 1654, Madras became the headquarters of all the British possessions in the East. In 1681, the new settlements were opened in Cuddalore and Portonova. Fort St.David was built at Cuddalore.

4. Coming of the Danes:

The Danish East India Company was established in 1616 in Denmark. They founded a settlement at Tranquebar in Nagapattinam in 1620. Their merchants were not prominent. In the 19th century they sold

their factories to the English due to the irregular supply of money and arrival of ships from their home country. They lost their influence as well as interest.

5. Coming of the French :

The French East India Company was founded in the year 1664. The French seized Santhome near Madras, but surrendered the same to the Dutch. In 1674, Francis Martin obtained a small village of Pondicherry from the Sultan of Bijapur. In 1699, the French lost Pondicherry to the Dutch. But it was restored by the Treaty of Ryswick. In 1701 it became the headquarters of the French possessions in India. The French occupied Mahe on the Malabar coast in 1725 and Karaikal in 1739, from the Marathas of Tanjore .

ENGLISH - FRENCH COLONIAL RIVALRY

In the beginning of the 18th century the French and the English were powerful in India. The English established their supremacy in Madras, Calcutta, and Bombay. The French had their settlement at Pondicherry. Both of them wanted to establish their authority in India. This resulted in the outbreak of Carnatic wars.

The first carnatic war (1746 - 1748):

Causes: In 1744 the war of Austrian succession broke out in Europe between Austria and Prussia. While the French supported Prussia, the English stood by the side of Austria. Both of them were eager to extend their trade relations in India. Dupleix the French governor of Pondicherry wanted to drive away the English from India.

Course of the war: Dupleix marched towards Madras where he defeated the English naval fleet and captured Madras. The English made a complaint to Anwar-ud-din the Nawab of Carnatic. The Nawab ordered Dupleix to return Fort St.George to the British. But Dupleix did not obey. Anwar-ud-din sent a large army to recover

Madras (Chennai) from Dupleix. But the Nawab's forces were defeated by the French at Santhome near Adayar in 1746. The French forces plundered Madras.

The French tried to capture Fort St.David at Cuddalore. But Major Lawrence, the British general defended it. Though the French failed to capture the fort, the war proved the might of the French and the ability of Dupleix.

Result: The first carnatic war came to an end by the treaty of Aile-La-chappelle in 1748 and settlement was reached between English and French in the Carnatic Coast. The French left and the English got back Madras.

The Second Carnatic war (1749 - 1754):

Causes: The Nizam of Hyderabad died in 1748. His son Nazir Jung became the Nizam. Muzzafur Jung his nephew opposed him. Anwar-ud-din , the Nawab of Arcot opposed his uncle, Chanda Sahib. Muzzafur Jung and Chanda Sahib joined together and sought the help of the French. The dispute for the throne of Hyderabad and Arcot were the causes for the war.

Course of the war: The French army joined the army of Chanda Sahib and Muzzafur Jung near Arcot in 1749. Anwar-ud-din was defeated and killed in the war. Chanda Sahib became the Nawab of Carnatic. He rewarded Dupleix by giving the villages of Valudavoor, Villianoor and Bahur near Pondicherry..

Anwar-ud-din's son Mohammed Ali escaped to Tiruchirapalli and took refuge in the Fort of Tiruchirapalli. It was beseiged by Chanda Sahib. Mohammed Ali sought the help of the English to save him and attack Arcot.

Robert Clive an army officer of the English attacked Arcot. Chanda Sahib sent an army from Tiruchirapalli to capture Arcot. But Robert

Clive along with Major Lawrence marched to Tiruchirapalli and defeated the Chanda Sahib's army. The French were defeated at Arani and Kaveripakkam.

Results: The English emerged successful in the war which ended with the Treaty of Pondicherry in 1755. Mohammed Ali was declared the Nawab of Arcot.

Third Carnatic War (1758-63):

Cause: The Seven Years War in Europe was the immediate cause for the third Carnatic war.

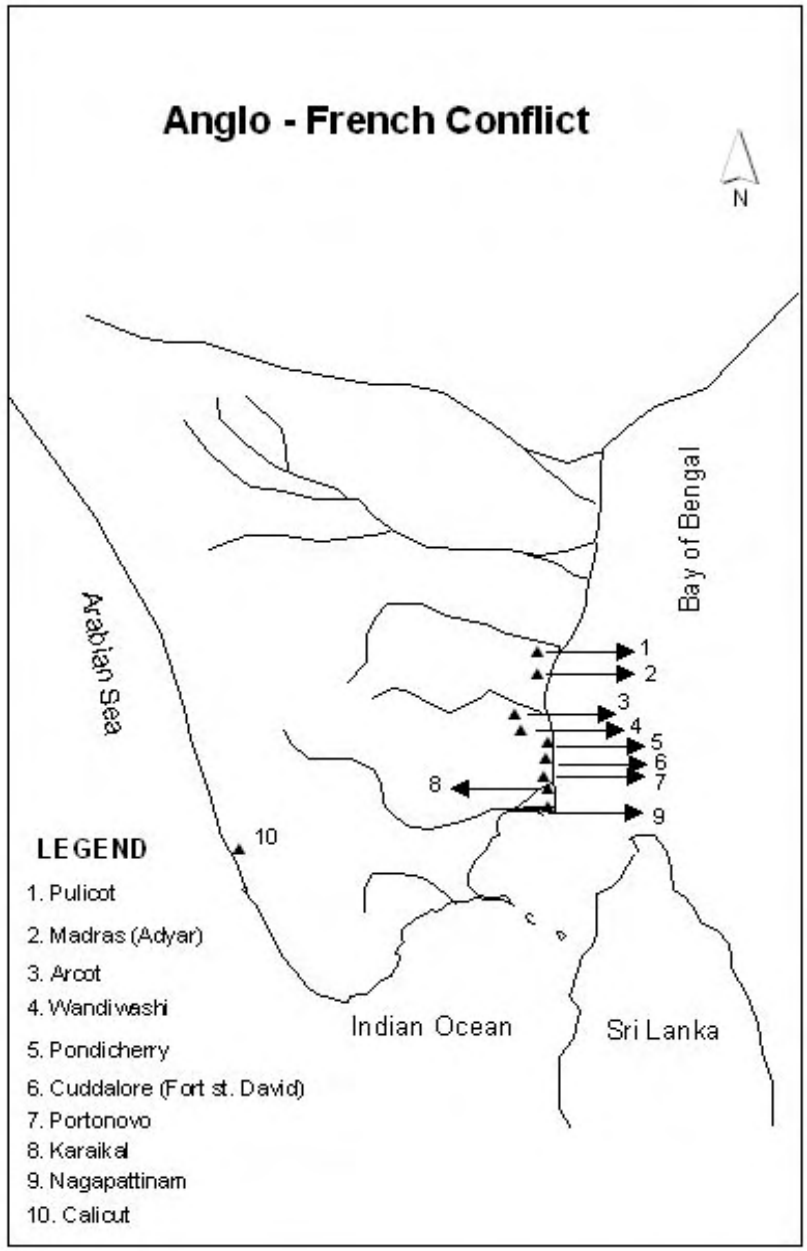
Course of the war: Count-de-Lally was the French Governor. He captured Fort St David at Cuddalore with a view to annexe Chennai. He attacked the ruler of Tanjore. He called Bussy from Hyderabad to attack Chennai. Robert Clive sent his General Sir Eyre Coote to fight against the French. A war took place between the French and the British at Wandiwash where Count-De-Lally was defeated by Sir Eyre Coote. The English captured the French territories.

Sir Eyre Coote was honoured with the title "Hero of Wandiwash"

Results: In 1763 the seven years war ended with the Treaty of Paris. Pondicherry and Karaikal were given to the French on a condition that they should not fortify them. Thus Anglo French struggle came to an end in 1763.

Causes for the success of the English:

1. There was lack of co-operation among the French officers. But the English worked unitedly. So they won the war.
2. The British were lucky to have able generals like Lawrence, Clive and Eyre Coote.
3. The French were not successful in Europe. So they were unable to compete with the British in Carnatic.



4. The British Naval power was superior in comparison with the French Naval power in Europe. So they were unable to compete with the British. This resulted in the defeat of the French.
5. The English East India Company was a private company. But the French East India company was a public company. So the French were unable to mobilise their resources.

ESTIMATE:

ROBERT CLIVE: Robert Clive first arrived in 1743 as a civil servant in the British East India Company. Later he transferred himself to the military service of the company . He got married at a church in St.George Fort in Madras. The foundation of the British Empire in India was laid down by Robert Clive. He was known as the 'Conqueror of India'. The capture of Arcot by Robert Clive was the turning point in the history of the English East India Company. So he was called the 'Hero of Arcot'. Due to his success in the war he was appointed as the first governor of Bengal (1757-60). He also introduced a new administrative system in Bengal known as Dual government (Dyarchy).

DUPLEIX: Dupleix played a vital role in establishing the French power in India. Dupleix was born in 1697. In 1731 he was appointed as the Governor of Chandranagur a French possession in Bengal. In 1742 ,he was made the governor of not only to Pondicherry but to all the French possessions in India. His desire was to drive out the British power from the Indian soil. He wanted to establish a French Empire in India, but he could not accomplish it.

Learning Outcome

1. Acquired knowledge about the Europeans who came to Tamilnadu.
2. Will analyse the causes of Anglo-French rivalry in the Carnatic region.

SELF EVALUATION

I Choose the correct answer

1. Constantinople was captured in the year
   a)1498 (b) 1453 (c) 1492 (d) 1484
2. The first among the Europeans to discover a sea route to India was
   a) Danish (b) French (c) Portuguese (d) British.
3. The Dutch were the people of
   a) England (b) France (c) Holland (d) Denmark.
4. The first carnatic war ended with the treaty of
   a) Aix-la-Chapelle (b) Pondicherry (c) Paris (d) Allahabad
5. Hero of Arcot was
   a) Dupleix (b) Count-de-Lally, (c) Bussy (d) Robert Clive.

II. Fill in the Blanks:

1. The Venician traveller ———————— had given accounts about Tamilnadu.
2. The Dutch set up a factory at ———————— in 1608.
3. The French East India Company was started in the year ——
4. The English East India company obtained a Royal Charter from ———————— on 31, Decemebr 1600 to trade with India.
5. ———————— in Europe was the cause for the Third Carnatic war.
6. Sir Eyre Coote was honoured with the title of ————————
7. In 1763 ———————— ended with the Treaty of Paris.

III Match the following:

1.	Constantinople	Cuddalore
2.	Francisco-de-Almedia	Dutch settlement
3.	Francis Martin	Turks
4.	St.David Fort	Blue water policy
5.	Nagapatnam	Pondicherry

IV Answer the following briefly:

1. Name the Dutch settlements in Tamilnadu.
2. What were the causes for the first carnatic war?
3. Write a note on the treaty of Pondicherry
4. Mention the causes of the III carnatic war
5. Why Sir Eyre Coote was called the 'Hero of Wandiwash'?

V Answer in detail

1. How did the Portuguese establish their power in Tamilnadu?
2. Explain the First carnatic war.
3. Mention the causes and the course of the second carnatic war.
4. What were the causes for the success of the English in Tamilnadu?

PRACTICAL ACTIVITIES

1. On the map of Tamilnadu mark the settlements of the Portuguese, the Dutch, the French and the English.
2. On the map of Tamilnadu mark the places connected with carnatic wars.

2. REVOLT OF PALAYAKKARS AND VELLORE MUTINY

Leaning Objectives

1. **Knows that the Tamils were one of the Pioneers to fight against the English.**
2. **Knows about the sacrifices of the Palayakkars like Kattabomman and Oomaithurai.**
3. **Understands the conflict between the English and the Marudu brothers.**
4. **Knows about the Vellore Mutiny.**

REVOLT OF THE PALAYAKKARS

In Tamilnadu, as in other parts of India , the earliest expressions of opposition to English rule took the form of localised rebellions and uprisings. Chief among them was the revolt of Palayakkars against the East India Company in 1799.

The Palayakkars originated in Tamilnadu during the Vijayanagar rule, in the reign of Visvanatha Nayak of Madurai. Palayakkar was the holder of a territory or a Palayam. It was granted to him in return for his military service as a tribute. During the 17th and 18th centuries the Palayakkars played a vital role in the politics of Tamilnadu. They regarded themselves as independent. The Palayakkars who resided to the west of Tirunelveli were the Maravas, and the east were the Nayaks. The western Palayakkars were under the control of Pulithevan while the others were under the control of Kattabomman.

The East India company eager for revenue opposed the manner and scale in which the Palayakkars collected taxes from the people.

By the Carnatic Treaty of 1792, the English gained control over the Palayakkars. The early struggle between the Palayakkars of South and the East India company had a strong political dimension. The English treated the Palayakkars as a rival power. The Palayakkars disliked the overlordship of aliens. The result was the outbreak of the rebellion of Palayakkars in 1799.

Causes for the rebellion:

1. The Treaty of the Carnatic and the Treaty of Srirangapatnam in 1792 consolidated the English power over the Palayakkars. The Palayakkars waited for an opportunity to drive away the English from Tamilnadu.
2. By the Treaty of Carnatic the English got the right to collect taxes from the local powers. Collectors were appointed for the collection of taxes from the Palayakkars.
3. The Palayakkars were not prepared to serve under the English.
4. The English followed the policy of annexation. Some of the Palayams annexed by them were Ramanathapuram, Manaparai, Palani, Yerrakottai and Chennelgudi. This policy of annexation by the English was not liked by the them.

I. Pulithevan: Pulithevan was the pioneer fighter in Tamilnadu, to protest against the English rule in India. He was the Palayakkar of the Nerkattumsevval, near Tirunelveli. During his tenure he refused to pay the tribute neither to Mohammed Ali, the Nawab of Arcot nor to the English. Further he started opposing them. The forces of the Nawab and the English attacked Pulithevan. But the combined forces were defeated by Pulithevan at Tirunelveli. After this victory Pulithevan attempted to form a league of the Palayakkars to oppose the British and the Nawab. But the Palayakkars of Sivagiri, Ettayapuram and Panjalamkurichi failed to support him.

Pulithevan

In 1759, Nerkattumsevval was attacked by the forces of Nawab of Arcot under the leadership of Yusuf Khan otherwise known as Khan Sahib. Pulithevan was defeated at Anthanallur and the Nawabs forces captured Panayur, Vasudhevanallur and Nerkattumsevval. Pulithevan who lived in exile recaptured Nerkattumsevval in 1764 after the death of Khan Sahib. However he was defeated by Captain Campell in 1767. The whereabouts of Pulithevan still remains a mystery.

The career and struggle of Pulithevan is an example of a chieftain against the superior powers.

II. Vira Pandya Kattabomman: Virapandya Kattabomman was born in 1761, He became a Palayakkar in 1790. The collection of tribute was the main cause for the rivalry between the English and, Kattabomman. In September 1798, the tribute from Panjalankurichi fell into arrears. As there was a severe drought, he found it difficult to collect taxes for the payment of tribute. The collector of Ramanathapuram wrote several letters to Kattabomman asking him to pay the arrears. But Kattabomman denied the demand of the collector.

Colin Jackson, the British Collector directed Kattabomman to meet him at Ramanathapuram. When Kattabomman wanted to meet the Collector with money at Tirukuthalam, the collector refused to meet him. Kattabomman again followed the Collector to Sivagiri, Sattur and then to Srivilliputur for about 23 days. Then he was ordered to meet the Collector at Ramnad. On 19th September 1798 Kattabomman and his minister SivaSubramaniya Pillai met the Collector at Ramalinga Vilas in Ramanathapuram. The Collector insulted them and tried to arrest Kattabomman and his minister. Kattabomman escaped with the help of his brother Oomathurai, but his minister Pillai was arrested by Jackson.

Kattabomman sent a letter to the Madras Council narrating the behaviour of the Collector Jackson. Kattabomman wanted his minister to be released. Edward Clive, the Governor of Madras Council ordered Kattabomman to surrender.. Edward Clive also dismissed the Collector for his misbehaviour and released Siva Subramaniya Pillai. Kattabomman decided to submit. So Edward Clive appointed a Commission and Kattabomman appeared before it on 15th December 1798.

Kattabomman and the league: Marudu Pandya of Sivaganga formed a League with the neighbouring Palayakkars.. Kattabomman was interested in this league. The Collector Lushington prevented Kattabomman from meeting Marudu brothers. But Marudu Brothers and Vira Pandya Kattabomman plotted out a plan for the conflict with the British. Kattabomman tried to establish his influence with Sivagiri, who refused to join the alliance of the rebels. Kattabomman advanced towards Sivagiri. But the Palayakkar of Sivagiri was a tribute to the Company. So the Company considered the expedition of Kattabomman as a challenge to their authority. The Company ordered the army to march to Tirunelveli.

Advance of the British army: Lord Wellesly sent an army under Major Bannerman on May 1799 to fight against Kattabomman. The Major served a letter directing Kattabomman to attend on him at Palayamkottai on 4th September , Kattabomman refused due to lack of time.

Fall of Panjalamkurichi: Bannerman moved his army to Panjalamkurichi on 5th September. They cut of all the communications to the Fort. Bannerman deputed Ramalinga Mudaliar to send a message asking Kattabomman to surrender, which Kattabomman refused. Mudaliar gathered all the secrets of the Fort and on the basis of the report, Bannerman decided the strategy of the operation. In a clash at Kallarpatti, Siva Subramaniya Pillai was taken as a prisoner. Raja

of Pudukottai captured Kattabomman from the jungles of Kalapore and handed him over to the Company.

Execution of Kattabomman: After the fall of Panjalamkuruchi, Bannerman brought the prisoners to an assembly of the Palayakkars and after trial sentenced them to death. On 16th October 1799, Kattabomman was hanged near Kayathar Fort, close to the town of Tirunelveli, in front of the fellow Palayakkars.

III. Marudu Brothers: In the later half of the eighteenth century the rebellion against the British was carried by Marudu Brothers in South India. Marudu brothers were the sons of Mookiah Palaniappan and Ponnathal. The elder brother was called Periya Marudu and the younger brother Chinna Marudu. Chinna Marudu was more popular and was called Marudu Pandiyan.


Chinna Marudu

Chinna Marudu served under Muthuvaduga Natha Devar of Sivaganga. In 1772 the Nawab of Arcot laid seige of Sivaganga and captured it. However after a few months Sivaganga was re-captured by Marudu Brothers and Periya Marudu was made the ruler. After the death of Kattabomman his brother Oomathurai left Panjalamkuruchi and took shelter elsewhere. He wanted to take revenge on the English who were responsible for the death of his brother. It was at this time that Marudu brothers gave shelter to Oomathurai and supported him.

Chinna Marudu was called "Lion of Sivaganga"

This act of Marudu brothers enraged the English. They prepared for an attack on Sivaganga. Marudu brothers were also prepared to meet the challenge. The English accused Chinna Marudu for capturing Sivaganga. This action of the English forced Chinna Marudu to start his operations against them. In June 1801 he issued a proclamation against the British.

A copy of the proclamation was pasted on the walls of the Nawab's palace in the fort of Tiruchi and another copy was placed on the walls of the Vaishnava temple of Srirangam. Thus Marudu brothers spread the spirit of opposition against the English every where.

The Proclamation of 1801 was the first call to the Indians to unite against the British.

As a result many Palayakkars of Tamilnadu went on a rally to fight against the English. Chinna Marudu collected nearly 20,000 men to challenge the English army. In May 1801, the English attacked the rebels in Thanjavur and Tiruchi areas. Divide and rule policy followed by the English spilt the forces of the Palayakkars. The rebels went to Kalayarkoil. They were again defeated by the forces of the English. Oomathurai was captured and beheaded. The Marudu brothers were executed in the Fort of Tirupathur in Ramanathapuram District. Though they fell before the English, they were the pioneers in sowing the seeds of nationalism in the land of Tamil. Thus the South Indian Rebellion is a land mark in the history of Tamilnadu.

VELLORE MUTINY

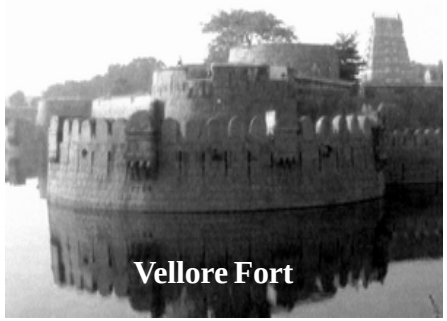
The Vellore Mutiny of 1806 was a prelude to the great Mutiny of 1857. It was one of the significant events in the history of Tamilnadu. The death of Tipusultan and the events that followed the battle of Srirangapatnam were responsible for the Mutiny. This Mutiny was suppressed within a short period. But it made a strong impact in the minds of the people of Tamilnadu.

In 1799 after the death of Tippu Sultan, his sons and family members were imprisoned in the Vellore fort. Many of the trained soldiers of the various Palayams were admitted into the English army. The soldiers in the Vellore fort decided to oppose the dress regulations introduced by the British. The soldiers were asked to shave their head and moustaches. They were prohibited to have religious markings on the forehead. Further they were also directed to put a new model of

turban with a badge of cross on it. Both the Hindu and Muslim soldiers opposed it. The Hindus suspected that it was an attempt for conversion .So the soldiers threw their turban in view of their protest against the English. But the soldiers were severely punished by the English.

The Indian soldiers were waiting for an opportunity to attack the English officers. They were supported by the Mysore forces. A few local supporters also agreed to help them. Hence an opposition was developed against the English authorities in Vellore during 1805-06.

Course of the Mutiny: The relatives of Tippusultan planned to capture the Fort of Vellore on 10th July 1806. But on the midnight of 9th July 1806 the sepoys at Vellore Fort came out of their camp. They made a sudden attack and opened fire on the European camp. The fort gates were closed. The British flag in the fort was brought down and torn to pieces. The flag of Tippu Sultan was hoisted on the fort of Vellore.


Vellore Fort

It was under these circumstances that Colonel Gillespie who was in Arcot rushed to Vellore. He made an attack on the rebel force. Many Indian soldiers were killed. The mutiny was completely suppressed. Peace was restored in Vellore.

Causes for the failure of the Mutiny:

1. The rebels sent letters to various rulers of South India to support their cause. But before they could get the help, the rebellion broke out.
2. There was also no leader to guide the soldiers properly.

3. Tippu's sons and relatives did not possess the necessary skill to fight against the enemies.
4. Divide and Rule policy of the English, split the unity of the Indians.

Learning Outcome:

1. **Understood the causes of the South Indian rebellion**
2. **Understood the patriotic heroism of Pulithevan, Virapandya Kattabomman and Marudu Brothers.**
3. **Understood the Vellore mutiny.**

SELF EVALUATION

I Choose the correct answer:

1. Palayakkars originated in Tamilnadu during the rule of
   a) Cholas (b) Pandyas (c) pallavas (d) Vijayanagar .
2. The first to protest against the British East India Company in Tamilnadu was
   a) Pulithevan (b) Virapandya Kattabomman (c) Oomathurai (d) Marudu Brothers.
3. Marudu brothers belonged to
   a) Panjalamkurichi (b) Sivaganga (c) Nerkattumsevval (d) Sivagiri.
4. The vellore Mutiny took place in the year
   a) 1799 (b) 1801 (c) 1806 (d) 1857.

II Fill in the blanks:

1. The Palayakkar was the holder of a ---------- or---------- .
2. The English gained control over the Palayakkars by the-----.
3. Pulithevan belonged to ----------.
4. Nerkattumsevval was attacked by the forces of the Nawab of Arcot in the year …….
5. Virapandya Kattabomman was born in the year ————-
6. Virapandya Kattabomman was hanged near -------- close to the town of Tirunleveli.
7. Chinna Marudu was called ----------.
8. Chinna Marudu's proclamation was the first call to the Indians to unite against the ----------
9. The Vellore Mutiny of 1806 was a prelude to the great Mutiny of --------.

III Match the following:

1. The treaty of Srirangapatnam	- Nawab of Arcot
2. Mohammed Ali	- 1792
3. British	- Brother of Kattabomman
4. Ommathurai	- 1806
5. The Vellore Mutiny	- Divide and Rule policy

IV Answer the following briefly:

1. Write about the meeting of Kattabomman with the Collector of Ramanathapuram.
2. How was Kattabomman executed?
3. Who were the parents of Marudu Brothers?
4. Write a short note on Oomathurai.
5. What were the causes for the failure of the Vellore Mutiny?

V Answer in detail:

1. What were the causes for the Palayakkar Rebellion?
2. Write a note on the revolt of Pulithevan against the British.
3. Briefly discuss the role of Virapandya kattabomman in the League.
4. Narrate the national spirit of Marudu brothers against the English.
5. Examine the course of the Vellore Mutiny.

PRACITCAL ACTIVITIES

1. Collect the pictures of the famous Palayakkars of Tamilnadu.

3. ECONOMIC CONDITION OF TAMIL NADU UNDER BRITISH

Learning Objectives

1. **Acquires knowledge about the economic condition of Tamilnadu with reference to land revenue, agriculture and irrigation.**
2. **Understands the causes for the decline of Handicrafts.**

Tamilnadu economy was dominated by agriculture. From the very early times rulers and the public have shown interest in irrigation works. Failure of the monsoon, floods and storms during the rainy season hit the peasants.

Land revenue was the main source of income to the Government. Besides the land revenue, income tax was also collected. The manufacture of Aluminium utensils, shoes, boots and other articles of leather were in existence. Several new industries came into being.

The Indian Trade Union Act of 1926, the Mines Act of 1935, Workers Compensation Act of 1923, etc protected the interests of the workers. Tamilians went to foreign countries for the betterment of their life. They went to Ceylon,Malaya,Singapore, Burma and South Africa. They worked in the Tea plantaions of Ceylon, Rubber plantations of Malaya and Mines of South Africa. But after Independence in these countries, the Tamilians were put to several hardships.

Land Revenue System: When the company took over the administration of the country, different forms of revenue collections

were in operation. The company set the task of evolving a land revenue system to maximise its revenue. In this process it experimented with different methods of Revenue settlement.

Permanent land revenue settlement: From 1792 the company reorganised the working of the Revenue Department. Thanjavur came under the company rule in 1799 and Carnatic region in 1801. Edward Clive, the Governor wanted to introduce an uniform tax system. He wanted to enforce the Permanent settlement system of Cornwallis. In Chenglepet the permanent system was experimented. This system brought large tracts of land under a single unit for taxation. It was called Mitta. The Mitta's were leased to Mittadars, Brehmehal region was brought under this permanent system in 1802. Palayams were converted into Zamins. The company adapted the system of lease in the collection of tax. This system failed in Chenglepet, Salem, Dindugal, Ramanathapuram and Tirunelveli.

Village Settlement: Since the Permanent Revenue System did not fulfil the expectations of the company, between 1804 and 1814 the village lease system was implemented in the districts of Tirunelveli, Tiruchirapalli, Coimbatore, South Arcot and North Arcot. Under this system the company farmed out the lands to the principal cultivators. They further divided and leased the land to the individual ryots. As there was no difference between the Permanent revenue settlement and village settlement, the company directed the Madras Council to implement the Ryotwari settlement.

Ryotwari Settlement: Corn Wallis, appointed Alexander Reed, and Thomas Munro to reform the revenue system. After deep analysis Thomas Munro introduced the Ryotwari System.This system was introduced in Chennai Presidency between 1820-27. Later this system was introduced in Salem, Malabar, Thanjavur and Royalaseema. According to Munro the term

Ryotwari refers to the direct connections of the ryots (farmers) with the government. Its aim was to pay tax directly to the government, hence this system was called Ryotwari.

The main features of this settlement were:

1. The Taxable land was made known.
2 The ryots right over the lands were settled.
3 Waste lands were brought under the control of the government.
4 Probable tax was assessed.
5 The ryots were given the right to complain against tax collectors.
6 The ryots were also given the right to appeal for over taxation.

Merits of the Ryotwari System:

1 Ryots paid tax directly to the government.
2 The quantum of the tax payable was known.
3 Government was assured of a fixed revenue through tax.
4 Unwanted lands were not thrusted on peasants.

Demerits of The Ryotwari System:

1. In most places the revenue fixed was high. The ryot was left with nothing for his maintenance.
2. The settlements were made directly with the cultivators. While measuring the land and assessing the revenue, the landlords were ignored.

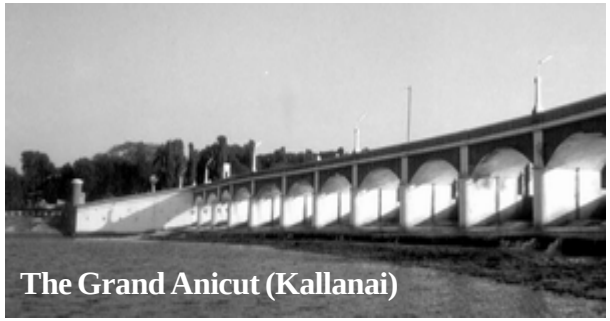
By 1857 most of the Tamil country was brought under the Ryotwari System.

The Mahalwari System: The Mahalwari system was introduced in 1833 by Lord Willam Bentick. Under this system the peasant and the proprietors entered into a contract with the state for a fixed period. The position of the cultivators under Mahalwari and Ryotwari systems were identical.

Agriculture: Agriculture is the back bone of our Economy. Agriculture was the main source of livelihood for about 95% of the

people of Tamilnadu. In the middle of the 18th century land was in abundance while the population was limited. The people practised extensive cultivation. The farmers produced mainly food crops. The methods and techniques of production were old and backward. There was no modernisation in agricultural sector. Agricultural society was predominantly feudal in character. Cultivators used to pay land revenue to the rulers. The British followed the policy of encouraging the cultivation of cash crops, like cotton, jute, indigo, paper, sugarcane, tobacco ,oilseeds etc. The main purpose of cash crop cultivation was to increase the production for sale. This led to commercialisation of agriculture. The development in commercial agriculture was found in tea, coffee and rubber plantation.

Irrigation: Irrigation in India had a history even from the ancient period. The Grand Anicut (Kallanai) is regarded as one of the greatest engineering feats of ancient India. It is believed to have been originally built by Karikala Cholan in the Second century A.D. The upper Anicut



The Grand Anicut (Kallanai)

constructed in 1839 over the Cauvery, was the first major project in the British period. Lower anicut was built around the same period. Lord Dalhousie established the Public Works Department in 1852 in Madras Presidency. The Tank Restoration scheme was started in 1883 for investigating the condition of tanks. The larger tanks irrigating over 200 acres of land were placed under the Public Works Department and the tanks irrigating less than 200 acres of land were placed under the Revenue Department. The departments were granted

large sums of money for repairs and maintenance. several important anicuts such as the Tirukoilur in 1895, Sethiatope in 1895 and Palar in1896, Periyar in 1897 belong to this period. The last major project of the pre-independence period was the Mettur dam in 1934.

Comming of Industrial Goods: After the 1857 revolt the whole of English territories in India were brought under the British Crown. Queen Victoria was proclaimed as the ruler of India. This created a golden opportunity to British merchants. India with its more than 30 crores of population, then, proved to be a dumping yard to British products. Under the British rule the industrial goods were brought to Tamilnadu. The plantation industries of Indigo, Tea and Coffee were the first to be introduced in India.

Clothes made of synthetic fibre were brought to Tamilnadu. They replaced the traditional Khadi products. The Indians were forced to buy the British products. Locomotives and steam engines were brought to Tamilnadu. Telegraph, Telephone and Postal systems were introduced. There was a great revolution in the Department of Railways. The Railway line between Madras and Arakonam was laid in 1856. Royapuram near Chennai was the first Railway station constructed by the British in 1856. Pamban Railway bridge was built between Rameswaram and Mandabam. The Broadcasting technology was brought by the British. All India Radio Station was started in 1936. The income to the British government came from industrial investment in plantations, mines, Banking and Insurance, shipping, jute mills etc. Thus the establsihment of modern industries began in India during the second half of the nineteenth century. But its growth was slow and steady.

Decline of Handicrafts: From being an exporter of artisan products, India was turned into a massive source of cheap raw materials such as cotton, Jute, Indigo and Tea. The famous artisan industry collapsed in the face of cheap machine made imports. On

account of the flooding of the market with the industrially produced goods, the demand for the products of the rural artisans declined. Many of the village artisans deserted their traditional occupations and migrated to urban areas.

Because of the introduction of Railway line in Tamilnadu by the British, the handicraft industries began to decline. The railways helped the British products to reach the remote villages in the country. The native products were not encouraged by the British. The gradual disappearance of the Indian rulers and their courts, who were the main customers of the handicrafts gave a death blow to the village industries. The products like Pottery, glass, khadi clothes, cotton goods, palm products and coir products lost their importance. The decline of handicrafts resulted in a large scale unemployment problem. Thus within half a century of the British rule in India, the handicraft industries, once the pride and glory of India declined gradually.

Learning Outcomes

1. **Understood the land revenue system, agriculture and irrigation of Tamilnadu.**
2. **Understood the causes for the decline of handicrafts.**

SELF EVALUATION

I Choose the correct answer:

1. The Indian Trade Union Act was introduced in the year
   a) 1923, (b) 1926, (c) 1934 (d) 1935
2. The permanent land revenue system was introduced by
   a) Corn Wallis (b) Wellesley (c) Willaim Bentick (d) Lord Dalhousie.
3. Mettur dam was constructed in
   a) 1895 (b) 1875 (c) 1897 (d)1934
4. The backbone of our economy is
   a) Industries (b) Agriculture (c) Trade & Commerce (d) Transport.

II Fill in the blanks:

1. Edward clive the Governor wanted to introduce an uniform ----------
2. ---------- introduced the Ryotwari System
3. The Ryots were given the right to complain against ----------.
4. By 1857 most of the Tamil country was brought under the ----------
5. Grand Anicut was built by ---------- in the second century A.D.

III Match the following:

1. Rubber plantation	Cash crop
2. Mahalwari system	1883
3. Tank Restoration Scheme	William Bentick
4. Indian Railway	Malaya
5. Tobacco	Lord Dalhousie

IV Answer the following briefly:

1. Write a note on village settlement.
2. What do you know about the Permanent Revenue System?
3. What were the cash crops promoted by the British?
4. Name the three dams constructed in Tamilnadu before independence.
5. What were the reasons for the decline of handicrafts in Tamilnadu?

V Answer in detail:

1. Examine the features of Ryotwari System and point out the merits and demerits
2. Explain the irrigational developments under the British.
3. write a note on Industrial goods brought by the British to Tamilnadu?

PRACTICAL ACTIVITIES

1. Pay a visit to Poombuhar and see the Handicraft goods.

4. EDUCATION IN TAMIL NADU BEFORE INDEPENDENCE: ROLE OF CHRISTIAN MISSIONARIES

Learning Objectives:

1. **Acquires knowledge about the growth of Education in Tamilnadu before Indian independence**
2. **Understands the contribution of Christian missionaries.**
3. **Understands the effects of western education**

Education during the ancient Period

'Learn while young" -was the maxim of ancient days. Many Tamil poets lived and worked for the promotion of education. During the sangam period, the kings and the chieftains also composed many poems. The Sangam literature refers that the women excelled in various arts like music, drama, dance etc. Women poets like Avvaiyar, Kakkaipadiniyar, Mudathamakanniyar lived during the sangam period. The sangam rulers patronised education and during that time, primary schools in villages functioned under the shades of a tree or in the temple. There were also centres of higher education. They were called Maths, Pallis or Viharas.

Pallava period witnessed progress in the field of education. Hindu, Buddhist and Jain educational institutions were established at centres like Kancheepuram. Kanchi was a great centre of 'Sanskrit literature'. Kailasanatha Temple was a store house of public documents. Hiuen-Tsang a chinese piligirim visited Kancheepuram during the period of Narasimhavarma Pallava. It is said that Dharmapala, the Chancellor

of Nalanda university belonged to Kanchi. Both Siva and Vaishnava Mutts encouraged the educational activities. Viharas and Jaina pallis propagated the Buddhist and Jaina system of philosophy. Centres like Ennayiram, Tribuveni, Kunrathur etc were some of the educational centres of Imperial Cholas.

Sekkilar who wrote Periyapuranam belonged to Kunrathur near Chennai.

Educational institutions were known as Salai in the Pandya period. They established educational Institutions at Kandallur salai (near Trivandrum) and Parthipasekarapuram. Under Raja Serfoji II, the Maratha ruler of Tanjore, the Saraswathi Mahal Library was established in 1824. Thus the Vijayanagar rulers, the Nayaks and the Marathas contributed for the development of education. Through the Madrasas, the Arabic and Persian education were imparted in Tamilnadu.

Role of Christian Missionaries

After the Renaissance and Reformation movement in the 15th and 16th centuries, the Europeans like the Portuguese, the Dutch,the English and the French visited India through sea route. They began to spread Christianity. They established missionary schools in various parts of Tamilnadu.

Growth of Christian Missionaries: It was the Portuguese who started the religious services in Tamilnadu during the 16th century. They started the Society of Jesus. Among the saints of this society, Father Fernandus occupies an important place. He started a church and a school at Punnakayal in 1567. The society of Jesus started more schools and colleges in Chennai, Nagapatnam, Tiruchy and Dindugal.

The contribution of Jesuits of Madura Mission was remarkable. **Father Robert de Nobili** a man of keen intellect arrived in 1605 and reached Madurai in 1606 during the rule of Muthukrishnappa Nayak.

He started the missionary activities in the south particularly in Madurai. He styled himself as a Hindu sanyasi,. adopted the brahminical method in spreading Christian ideologies to the people. Another distinguished personality of Madura Mission was John de Britto. He went to Ramnad and Pudukottai to spread christianity. Father Constantine Joseph Beschi, popularly known as Veeramamunivar served in the Mission from 1711-1742. He was the author of Thembavani, the famous Tamil literature. Besides he wrote grammar books and dictionaries in Tamil language.

The American Jaffna Mission was established in 1834. It opened more schools in Madurai, Dindugal and Ramanathapuram. The Arcot Mission was started in 1853 by Scudder Brothers of USA. They established hospitals, charities and educational institutions. They were more popular among the downtrodden people. They started Voorhees college and many schools in Arcot districts.

In Chennai, Ignatious Loyola Mission founded the Loyola College. Madras Christian College at Tambaram, Scott Christian College at Nagarcoil, American College at Madurai, St.Joseph College at Tiruchi, St.Xavier College at Palayamkottai, and Women's Chritisan college at Chennai were founded to give education to people. More schools and colleges were also founded in Chennai and Chenglepet. The Protestant missionaries had started schools and colleges in Chennai, Tanjore, Cuddalore, Tiruchy, Palayamkottai and Nagarcoil. The Basel Mission provided employment to trained orphans. It gave a new ray of hope to the poor people. The London Mission Society concentrated mainly in Nagarcoil , Neyyur and Palayamkottai. It gave more importance to the development of education. The christian missionaries were the first to introduce the western education in Tamilnadu. The missionary schools admitted the students from all sections of people irrespective of caste and creed. Thus the christian missionaries in Tamilnadu played a dominant role in the progress of education.

Education under British

The English East India Company for a long time hesitated to concentrate on education. This was because of lack of funds. However the condition began to change and a humble beginning was made by the **Charter Act of 1813.** It allotted annual expenditure of one lakh rupees for the promotion of western education. In continuation of this, the School Book Society was founded in 1819. Thomas Munro became the Governor of Madras in 1820. He argued that investment on education will never be a waste. In 1822 an Education Commission was set up. The Board of Public Instruction was started and public schools were established in each district. Schools at taluk level were also encouraged. During his tenure nearly 70 schools were established in Madras Presidency.

The Board of Public Instruction was started in 1823 and Sir A.J.Arbuthnot was the first Director of Public Instruction.

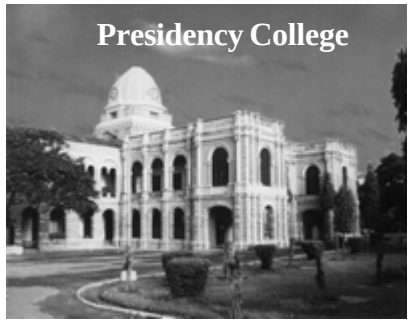
Filtration Theory: The East India Company introduced the Filtration Theory of education in1830. Accordingly, the education was given to higher class of people and they in turn had to impart education to the common mass. This theory proved to a failure because the education did not reach the mass from the higher level. The Madras Medical school (1835) Madras Presidency School (1836) Madras Christian School (1840) and Pachiyappas School (1841) served the needs of the urban aristocrats. Except urban schools, other schools were neglected .

Wood's Despatch: The company realised its fault and reformed the education through the famous despatch of Charles Wood in 1854. The 'Woods Despatch' replaced the "Filtration theory". It aimed to link all stages of education from primary education to college education. It gave wider scope for spreading western knowledge. Under the new scheme, district and taluk level schools were increased in number. These schools gave education through mother tongue. The English

became one of the subjects of study. Vernacular schools were also started.

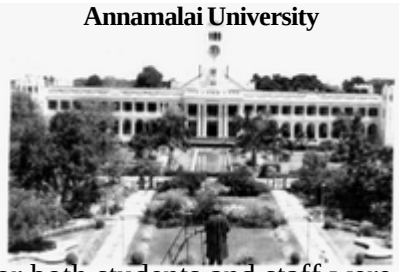
Charles Wood's Despatch was called the Magna Carta of Education.

By the middle of the 19th century education had a steady growth. The higher education took a definite shape. The Medical School functioning at Madras from 1835 grew into a Medical College in 1851. The survey school grew into an Engineering College at Madras in 1857. The Presidency school grew into the Presidency College. It became the college for the princess and barons. The Act of 1857 created the Madras University. By 1859, it became a full fledged university. In the second half of the 19th century more colleges grew in Madras, Coimbatore, Salem,Tiruchy , Madurai and Palayamkottai.


Presidency College

Hunter Commission: In 1882, the Hunter commission enquired the working of education. It found out that there was a gross neglect of primary education. Rural Tamilnadu as in India suffered a total neglect. Hence Hunter Commission recommended to distribute the responsibilities of education to Municipalities and District Boards.

In 1890 the Governor of Madras Lord Connemara established the Connemara Library.


Annamalai University

In 1891 the Law College was established in Madras. The Annamalai University was established in 1929 by Raja Sir Annamalai Chettiar. Including Marine Biology all other faculties were opened. Hostel facilities for both students and staff were

provided. It had a vast library with volumes of books and periodicals.

The state witnessed a phenomenal growth of education during the 20th century. More number of schools and colleges were established. Under the Government of India Act of 1935, education was made as a state subject. As per Sir John Sergeant plan of 1944, education was made free and compulsory for students between the age group of 6 and 14. Thus slowly and gradually education in Tamilnadu began to progress in a considerable manner.

Merits of western education:

1. The western education prepared the people for the intellectual and social renaissance. Bharathi, the greatest Tamil poet of 20th century expressed his progressive ideas. He aimed at social justice and education for all.
2. The western education also developed national consciousness.
3. It brought 'Unity in Diversity'. The people knowingly or unknowingly came closer and prepared themselves for a national movement. It led to the political unity.
4. The system of education introduced by the English gave adequate importance to technical and women's education.

Demerits of western education:

1. This system of education neglected the mass education.
2. The people who were taught in English medium alone were given employment opportunities. They were appointed as clerks by the British government.
3. The foreign medium of instruction created a wide gulf between the educated and the uneducated.

Learning outcome

1. **Understood the education in Tamilnadu before independence.**
2. **Acquired knowledge about the impact of western education in Tamilnadu.**
3. **Understood the services of the Christian missionaries.**

SELF EVALUATION

I Choose the correct answer

1. The centre of sanskrit learning during the Pallava period was
   a) Ramanathapuram b) Kanchi c)Madurai
   d) Palayamkottai.
2. The Saraswathi Mahal library was established in the year
   a) 1813, (b) 1824,(c) 1857 (d) 1882
3. Thomas Munro became the Governor of Madras
   a) 1820 (b) 1822 (c) 1836 (d) 1841
4. The first Director of Public Instructions was
   a) Sir Thomas Munro (b) Charles Wood (c) A.J.Arbuthnot
   d) Lord Connemara.

II Fill in the blanks

1. During the Sangam period kings and the chieftains composed -----.
2. Hiuen-T-sang, a chinese pilgrim vistied Kancheepuram during the period of ----------.
3. Educaional institutions were known as ---------- in the Pandya period.
4. Sekkilar belonged to ----------.
5. Charter Act of 1813 allotted annual expenditure of ---------- Rupees for the promotion of western education.
6. The Charles Wood's Despatch was called the ---------- of education.
7. The Medical School functioning at Madras from 1835 grew into a ---------- in 1851.
8. Annamalai University was founded by ----------.

III Match the following:

1.	Madras University	Sekkilar
2.	Mudathama Kanniyar	1854
3.	Wood's Despatch	Sangam poet
4.	Robert de Nobili	1857
5.	Periyapuranam	Madurai Mission

IV Answer the following briefly

1. Write a note on Kancheepuram.
2. Write a short note on Arcot Mission.
3. Write briefly about the Wood's Despatch.
4. Mention any two demerits of the Western education.

V Answer in detail

1. Write a paragraph about the role of Christian missionaries.
2. Explain the Filtration theory.
3. Write a note on Hunter Commission.
4. Mention the merits and demerits of western education.

PRACTICAL ACTIVITIES

1. Collect the pictures and prepare an album about the educational institutions in your area.

5. ROLE OF TAMILNADU IN THE FREEDOM STRUGGLE

Learning objectives

1. **Acquires knowledge about the growth of nationalism in Tamilnadu.**
2. **Understands the achievements of Congress in Tamilnadu.**
3. **Recognises the role of leaders in the Freedom Struggle.**

MODERATES, EXTREMISTS AND GANDHIAN PERIOD

Tamilnadu played a vital role in the Indian freedom movement. Many leaders have shed their life for the cause of our freedom. Because of their sacrifice we got liberation and freedom from the British rule.

Rise of Nationalism: The nineteenth century witnessed the socio-religious reform movements. The rise of nationalism took its deep root in Tamilnadu. During that period, Swami Vivekananda stayed at Chennai and delivered his patriotic speeches. It kindled the spirit of the people to a greater extent. Raja of Ramnad helped Swami Vivekananda for his voyage to Chicago. His speech at Chicago was very famous. He loved and encouraged the youth of Tamilnadu. The press, particularly The Hindu, Swadesamitran and Desabakthan played a significant role in awakening the people. Means of transport like railways helped the Nationalists to carry their ideas even to the remote places of Tamilnadu.

In order to rise the prestige of Tamil people the Madras Native Association was founded in 1852. The grievances of the people were submitted to the British Government. Madras Mahajana Sabha was

established in 1884. G.Subramaniya Iyer, P.Anandacharlu, Rangaiya Naidu played a significant part in the association to redress the miseries of the people.

Rise of Indian National Congress: The Indian National Congress was founded by A.O.Hume in 1885. With the formation of Indian National Congress in 1885, the freedom movement gained momentum in Tamilnadu. The first conference of the congress was held at Bombay under the presidentship of W.C.Banerji. C.Vijayaraghavachariyar of Salem, a close associate of A.O. Hume, was one of the members of the committee which drafted the constitution of Indian National Congress. G.Subramaniya Iyer of Chennai participated and moved a resolution in the congress. In the beginning, the role of the Indian National Congress was not to oppose the British government, but to submit their grievances in a peaceful way. The sessions of Indian National Congress were convened at Madras in 1887, 1895 and 1898. C.Vijayaraghavachariyar took a prominent role in framing the rules of the congress during these years.

V.O.Chidambaram Pillai

During the early phase of the congress, V.O.Chidambaram Pillai led the people of Tamilnadu in the Independent struggle. He started the Swadeshi Steam Navigation Company at Tuticorin. He vehemently opposed the British imperialism To honour his service and sacrifice he was given the title Kappalottiya Tamizhan.

Surat Congress: The Indian National Congress was held at Surat in the year 1907. In this session ,Congress got split into extremists and moderates. The extremists were led by Balagangadhar Tilak.

Swaraj is my birth right' is the famous slogan of Balagangadhar Tilak.

Rise of Extremism: Balagangadhar Tilak was supported by V.O.Chidambaram Pillai and Subramaniya Siva. They were called the Lieutenant's of Tilak and they chanted the Mantra **'Vande Mataram'.** In Tuticorin, V.O.Chidambaram Pillai and Subramaniya Siva protested against the British administration. In 1908 the mill workers of Tirunelveli and Tuticorin struck work, Ashe the Sub Collector of Tirunelveli, fired into the crowd. The leaders who supported the workers were arrested and imprisoned at Coimbatore and Salem respectively.

Extremist activities: Ashe was murdered in 1911 at Maniachi Railway station by Vanchi Iyer, one of the patriots of Tamilnadu. Then, he shot himself dead. The writings of Bharathi, the national poet kindled the patriotic spirit of the people of Tamilnadu. V.V.S.Iyer started a Gurukulam at Cheranmadevi to give training to the extremists.

Home rule movement: It was started by Dr.Annie Besant in 1916. She induced the people through her patriotic ideas. She delivered her speeches at Marina and Luz in Chennai. Her writings and speeches helped the freedom fighters to achieve their goals. S.Subramaniya Iyer, Thiru V. Kalyana Sundaranar and Dr.Varadarajulu Naidu and E.V.Ramasamy Naicker helped her to promote the Home Rule ideas.

Dr.Annie Besant

Dr. Annie Besant started 'Common Wheel' and 'New India' newspapers .

C.Vijayaraghavachariyar, Thiru V.Kalyana Sundaranar, Varadharajulu Naidu, E.V.Ramasamy Naickear, S.Srinivasa Iyangar, Sathyamurthy and K.Kamaraj were the leaders of the moderates. They played a vital role in the freedom movement of Tamilnadu.

The period from 1920-47 is called the era of Gandhiji in the history of Indian National Movement.

Non Co-operation Movement: The people of Tamilnadu were angry with the British Government because of the Rowlatt Act and Jallianwala Bagh tragedy which occurred in 1919. Gandhiji moved the Non Co-operation resolution at Nagpur Congress session. It was presided by C.Vijayaraghava Chariyar, eminent Nationalist of Tamilnadu. Rajaji acted as the Lieutenent of Gandhiji. He along with Sathyamurthy and E.V.Ramaswamy Naicker led the non co-operation movement.

Events of the non co-operation movement: Rajaji was arrested and imprisoned in Vellore jail. Agitations occurred in different places. The leaders and the people boycotted the courts and the government offices. When the Prince of Wales visited Madras in 1921,his visit was boycotted by the congress leaders like Rajaji and Periyar. Agitations infront of toddy and arrack shops were held in various places of Tamilnadu.

Boycott of Simmon commission: Under the leadership of Sathyamurthy Simon commission was boycotted because there was no Indian member in it. In 1927, the congress volunteers organised a Satyagraha for the removal of the Statue of Colonel Neill (a tyrant of the 1857 Rebellion) errected at Madras. Many were arrested. Yet the statue was broken. The statue was removed and kept in the museum in 1937 when Rajaji became the premier of Madras.

Salt Satyagraha by Rajaji

Civil Disobedience Movement

Salt Satyagraha: on March 1930, Gandhiji violated the salt laws at

Dandi. Simulataneously, in Tamilnadu Rajaji violated the salt laws at Vedaranyam . From Trichi nearly 100 patriots headed by Rajaji marched to Vedaranyam. Leaders like Sardar Vedharatanam Pillai, T.S.S.Rajan, Srimathi Ruckmani Lakshmipathy took part in this salt satyagraha. It created awareness among the people against the British Government.

Many people like Rajaji, K.Kamaraj were arrested when they disobeyed the British government . **"No Tax Campaign"** was also conducted in many parts of Tamilnadu. At Tirupur on 11th January 1932 the police attacked a procession carrying National flags and singing national songs . As a result of the lathi charge, Tirupur Kumaran, a freedom fighter sacrificed his life. He demonstrated his patriotism by firmly holding the congress flag and shouting Vande Mataram against the British. It was a deed of patriotism, heroism and symbol of dedication.

Tirupur Kumaran

Tirupur Kumaran is popularly known as Kodikatha Kumaran

As per the directions of Gandhiji individual satyagraha was followed by the leaders of Tamilnadu. Many young leaders like Adikeasava Naicker, Salem Adi Narayana chettiar, Guruswamy naidu, K.Kamaraj, Omandoor Ramasamy Reddiar, Baktavatsalam, C.Subramaniyam and R.Venkatraman participated in the freedom movement.

Quit India movement: The resolution of Quit India movement was passed at Bombay congress session in 1942. On the advice of Gandhiji many leaders like K.Kamaraj participated in the movement. Leaders like Muthuranga Mudaliar, Baktavatsalam and R.Venkataraman were arrested. Disturbances spread all over Tamilnadu in support of the freedom movement.

In Madras the agitators led the procession . They raised 'Quit India' slogans, observed hartals and burnt the public offices. The workers of Buckingham and Carnatic Mills and Madras Port Trust struck work. In North Arcot the disturbances were severe. The agitators cut off telegraphic and telephone lines. They also burnt the public buildings at Vellore and Panapakkam. In South Arcot there were similar outbreaks. In Chidambaram, Annamalai University students went on strike. Many patriots were killed at Rajapalayam, Karaikudi, Devakottai, Tiruvadanai and Poolankuruchi. The British took severe actions against the agitators.

India towards Independence : The Cripps and Cabinet Mission visited India, and studied the condition. The interim government headed by Nehru assumed the office and Rajaji became the Home Minister of India in 1946. Mountbatten plan was accepted. The Indian Independence Act was passed in the British Parliament. India attained independence from the clutches of the British on 15th August 1947 after the heroic struggle.

Learning outcome:

1. **Learnt about the factors that led to the freedom movement.**
2. **Understood the achievements of the moderates and extremists.**
3. **Recognised the role of V.O.Chidambaram Pillai and K.Kamaraj in the freedom struggle.**

SELF EVALUATION

I Choose the correct answer:

1) The Indian National Congress was founded in the year
   a) 1852 (b) 1885 (c) 1907 (d) 1916
2) The extremists left the congress at the
   a) Surat session, b) Lahore session c) Lucknow session
   d) Bombay session.
3) The Quit India movement was started in the year
   a) 1935 b) 1942 c) 1945 d) 1946

4) India attained Independence on
   a) 15th August 1947 b) 18th August 1947 c) 20th August 1947
   d) 25th August 1947

II Fill in the blanks:

1) Vivekananda's speech at ……. is very famous
2) The Madras Mahajana Sabha was established in …….
3) The Indian National Congress was founded by ……
4) The extremists were led by ……
5) The period from …… to …… is called the era of Gandhi in the history of Freedom struggle.
6) Hume rule movement was started by …… in 1916.
7) In Tamilnadu Rajaji violated the salt laws at ……

III Match the following:

V.O.Chidambaram pillai	Maniyachi
Jallian wala Bagh	1930
Salt satyagraha	freedom fighter
Tirupur Kumaran	1919
Vanchi Iyer	Swadeshi Steam navigation company

IV Answer the following briefly:

1) Write a note on Madras Mahajana Sabha.
2) Write briefly about the Surat Session of the Congress.
3) Mention the extremist activities in Tamilnadu.
4) Mention the leaders of the moderates.
5) Write a note on Simon Commission.

V Answer in detail:

1) Enumerate the factors that led to the rise of Nationalism in Tamilnadu.
2) Write elaborately about the Non-Co-operation movement.
3) Write in detail about the Quit India Movement in Tamilnadu.

PRACTICAL ACTIVITIES

1) Read the biographies of Rajaji and Kamaraj
2) Prepare a chart showing the important events of Freedom struggle
3) Collect pictures of important freedom fighters of Tamilnadu .

6. 19th AND 20th CENTURY SOCIAL REFORM MOVEMENTS IN TAMIL NADU

Learning objectives

1. **Acquires knowledge about the social reform movements in Tamilnadu during the 19th and 20th centuries.**
2. **Understands the ideas of the reformers like Vallalar and Periyar.**
3. **Assess about the contributions of the reform movements.**

In the 19th century the society was influenced by radical thinkers due to the impact of western education. Tamilnadu showed the tendency for social change and reform movement. Many social evils like sati, poligamy, child marriage, untouchability, female infanticide were practiced in the state. In order to eradicate these social evils many social reform movements emerged in Tamilnadu. Following were the factors responsible for the emergence of reform movement.

Causes for the social reform movements

1. Western education: The spread of Western education created awareness in the minds of the people. The ideas of equality, democracy and liberty had influenced the people of Tamilnadu. They started questioning the superstitious beliefs and social evils that prevailed in our society. This led to the social reform movements in Tamilnadu.

2. Caste system: Tamil society was highly influenced by the 'Varnashrama' system. Accordingly, people belonging to the higher castes ill treated and humilated the backward and depressed class people. So the reformers wanted to free them from the miseries.

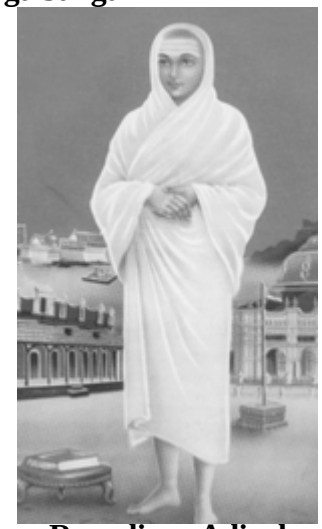
3. Economic condition: The British rule in Tamilnadu drained the economy to a great extent. Further they exported the raw materials like cotton and iron to their county. So this policy had suppressed the development of trade, commerce and small industries of Tamilnadu. This kind of economic exploitation also led to the reform movement in Tamilnadu.

4. Influence of European movements and ideas : The Renaissance, reformation, Geographical discoveries made the people to think in the lines of equality, liberty and fraternity. The French revolution and the Russian revolution also influenced the people . The people induced by the spirit of equality, started protesting against orthadoxy rituals and traditions in Hinduism.

5. Role of press: The press played a dominant role in creating awarness in the minds of the people. It awakened the masses towards the path of progress.

Samarasa Sutha Sanmarga Sangam

Ramalinga Adigal (1823-1874): Samarasa Sutha Sanmarga Sangam was started by Ramalinga Adigal popularly known as Vallalar. He was born in 1823 at Chinnamarudur near Chidambaram. He possessed spritual experiences from his childhood onwards. He loved solitude and spent most of his time in the temple. He underwent spiritual experiences till the age of 23. He lived near Mint in Madras.



Ramalinga Adigal

Now Mint is called Vallalar Nagar. After his saintly life, he moved to Vadalur and started a socio-religious organisation in 1867. This was known as Samarsa Sutha Sanmarga Sangam.

Important teachings of Vallalar:

1. Form of God is Arutperunjothi (Supreme grace of light).
2. Love is the master key to spirituality.
3. Religious ceremony has no meaning.
4. Meditation is the form of prayer.
5. Realisation of truth in all religions.
6. Caste and other social divisions have no meaning.

Services of the Samarasa Sutha Sanmarga Sangam: This Sangam aimed for the religious unity and communal harmony in the society. He severely condemned the rituals and caste beliefs. He promoted the universal love and brotherhood. He believed hunger and poverty are the greatest ills of the society.

In order to conduct prayer, he built a Sathyagnana Sabha. He also founded Sathya Darma Sala at Vadalur for feeding the poor. The Sathya Dharma Sala provides food to everyone, irrespective of caste and religion throughout the year. Vallalar showed his love and mercy not only on human beings but also on plants, insects, birds and animals. This is called "Jeeva Karunya" (Mercy to life)

NON BRAHMIN MOVEMENT

In the beginning of the 20th century communal clashes occurred between the brahmins and the non-brahmins. The brahmins occupied almost all the important key posts in the administration. The British gave them jobs though they constituted only 3% of the total population.

Origin of the Justice party: The non-brahmins were not given proper position in the Government and due recognition in the society. Hence the non-brahmins of Tamilnadu joined together under the leadership of Dr.Natesa Mudaliyar. The first meeting was held at his house in Triplicane, Chennai in 1912. This resulted in the formation of **"Chennai Dravida Sangam".** He opened a hostel for non-brahmin students in 1912 at Madras.

and formed South Indian Liberal Federation in 1916. They published 'Dravidian' in Tamil, ' Andhra Prakasika" in Telugu and "Justice" in English. Later in 1917, this association was called as the Justice Party.

South Indian Liberal Federation was renamed as Justice Party.

In the 1920 elections, Justice Party came to power. Subburayalu Reddiar became the Chief Minister of the Madras Presidency. After 1923 elections, Justice party Ministry was formed. In the 1926 elections the Justice Party failed miserably. Gradually the party lost its power and met a final blow in the 1937 elections.

Achievements of the Justice party:

1. During the Justice Party Government, all the communities shared the official and administrative benefits. The Justice party for the first time issued communal G.O. in 1921 and 1922 .
2. The staff selection Board was established in 1924 for the selection of the Govenment officials without any bias. On the basis of this, for the first time in India, Public Service Commission was established in 1929.
3. To encourage higher education Andhra University and Annamalai University were started in 1929.
4. The Hindu Religious Endowment Act was passed in 1921. Accordingly, non-brahmins were to be appointed as Archagas in the temple.
5. This party worked for the welfare of women. Hence by the Act of 1921, women were given Voting rights.

Fall of Justice party:

The Justice Party lost its power and popularity in due course of time. The party was in power when the country faced severe economic depression. The party participated in the ministry and adminstration when there was an opposition against the British Imperialism. So the

party lost the mass support. The party also lost its original disciplined and committed leaders. Hence it became unpopular.

Self respect movement: The brahmins dominated the administration in the British period. The non-brahmins were denied their chance in the administration. As they were treated badly, they started a self respect movement to maintain the respect. E.V.Ramasamy championed the cause of the Self-Respect Movement.

Life history of E.V.Ramasamy

E.V.Ramasamy popularly known as EVR/Periyar was born on 17th September in the year 1879 at Erode in a wealthy family. His father was Venkatta Naicker and mother Chinna Thayammal. He married Nagammai at the age of 19. He lived a very simple life.

Emergence of self-respect movement: EVR participated in the Non-co-operatin Movement against the British. He left the Indian National Congress in 1925 at the Kancheepuram session on the issue of communal representation. Then he started the self-respect movement in 1925. He started 'Kudiyarasu' a Tamil weekly in 1925 and 'Revolt' an English Journal in 1928 to propagate his ideas.

Aims of the self-resepect movement:

i) To promote rational thinking, self-respect and self-confidence.
ii) To protect the rights of the non-brahmins.
iii) To eradicate the social evils like injustice to women.
iv) To abolish superstitious beliefs.

Achievements of the Self-Respect Movement

i) Temple entry movement: Vaikom is a place in Kerala, where the people of downtrodden community were prohibited to enter into the temple. So Periyar started his struggle against the Government of Travancore in 1924. But the Government impriosned him. In spite of this, he continued his struggle. So the Government of Travancore issued an order allowing the downtrodden community into the temple. Hence Periyar was given the title "Vaikom Hero".

ii) Social reforms: The Movement severly opposed the system of untouchability in Tamilnadu. With the support of Justice party, the Anti-untouchability Act was passed in 1930. The movement also laid the foundation for casteless society in Tamilnadu. EVR worked for the inter-dining by abolishing the Gurukula system at Seranmadevi near Tirunelveli.

iii) Welfare of women: The movement passed a number of resolutions for the passing of legislations. The most important legislations were Widow Remarriage Act, Women's Right to property Act, Abolition of Devadasi Act, etc.

In the Women's conference held at Madras in the year 1938, EVR was given the title "Periyar".

Devadasi system: Devadasi system is one of the social evils in Tamilnadu. According to this system, the young women were dedicated to temples and were called 'Temple girls'. This highly degraded the women. Great leaders like Periyar and Dr.Muthulakshmi Reddy severely opposed this system. At last with the earnest effort made by Dr.Muthulakshmi, the system of Devadasi was abolished by the Act of 1930.

Dowry system: One of the burning evils in Tamilnadu is Dowry system. In the beginning Dowry meant gifts and presents voluntarily given to a girl by her parents at the time of marriage. But later it is made complusary and turned as a cruel practice. This system lead to female infanticide, bride burning and other cruelties against women.

Many social reformers like EVR, Dr. MuthulakshmiReddy, Ramalinga Adigal, G.Subramaniya Iyer, Bharathi, Bharathidasan fought

for the eradication of this evil. The Government of India also passed the Dowry Prohibition Act in 1961. (Amended in 1984) to punish the Dowry seekers.

Mass Media like Newspaper, TV, Radio, Cinema etc., also trying to generate public consciousness against this evil practice. Besides, many women's organisations like Women Indian Association, National Council for Women, Democratic Women's Association, etc., also play a vital role in uprooting this social evil.

Learning outcome:

1. **Understood the social evils that prevailed in Tamilnadu during the 19th century.**
2. **Learnt the services of the Social Reformers.**
3. **Acquired knowledge to oppose the social evils.**

SELF EVALUATION

I Choose the Correct Answers:

1. The Samarasa Suttha Sanmarga Sangam was founded by ----------
   (a) Periyar (b) Vallalar (c) Dr.Muthulakshmi Reddy
   (d) T.M.Nair
2. The Non-Brahmin students Hostel was organised in Chennai by----------.
   (a) Thiyagaraya Chetty (b) C.Natesan (c) Subburayalu
   (d) T.M.Nair
3. The Staff Selection Board was established in ----------
   (a) 1931 (b) 1924 (c) 1920 (d) 1917.
4. In the year 1920, Elections Justice Party came to power under
   (a) T.M.Nair (b) Subbarayalu Reddy (c) Sankaran Nair
   (d) Thiyagaraya Chetty.

5. The Dowry Prohibition Act was passed in ----------
   (a) 1971 (b) 1961 (c) 1981 (d) 1969.

II Fill in the Blanks:

1. Ramalinga Adigal was born at ----------.
2. Hero of Vaikom was ----------.
3. The South Indian Liberal Federation was renamed as ------
4. ---------- was a Tamil weekly started by Periyar in 1925.
5. By the Act of 1930 ---------- was abolished.

III Match the following:

1. Ramalinga Adigal	Justice Party
2. Sathya Dharma Sabha	Devadasi system
3. EVR Periyar	'Jeeva Karunya'
4. 1925	Vadalur
5. Muthulakshmi Reddy	Self-Respect Movement,

IV Answer the following briefly:

1. Who was called as Vaikom Hero? Why was he called so?
2. Give short note on Samarasa Suttha Sanmarga Sangam.
3. Mention the aims of the Self - Respect Movement.
4. What are the causes for the fall of the Justice Party?
5. Write a note on the Dowry Prohibition Act.

V Answer in detail:

1. Explain the causes for the rise of Social Reform Movements in Tamilnadu.
2. Examine the achievements of Justice Party.
3. What are the achievements of Self-Respect Movement?

PRACTICAL ACTIVITIES

1. Discuss about the teachings of Ramalinga Adigal.
2. Enact a Drama depicting the evils of the Dowry System.
3. Debate on the reforms of Periyar.

7. EDUCATION IN TAMILNADU AFTER INDEPENDENCE

Learning Objectives:

1) **Acquires knowledge about the progress of education, science, technology and media in Tamilnadu.**
2) **Understands the role of mass media in the society.**
3) **Describes the developments that took place after independence.**

The twentieth century witnessed a remarkable progress in the fields of education , science, technology and media. Education is a powerful means to bring social progress. The development of science and technology led to vast changes in all our social, political and economic systems. The revolution brought by media is a land mark in the history of Tamilnadu. Thus, the state of Tamilnadu witnessed an all round progress tremendously.

EDUCATION

After independence there was a need to revamp the educational system of our country. To suit the changing needs and aspirations of our people, our government appointed various commissions on education. The important educational commissions are:

1) University Grants Commission.
2) Secondary Education Commission.
3) Kothari Commission.
4) New Education Policy.
5) National Policy on education.

University Grants Commission (1948): The Government of India appointed the University Grants Commission in 1948 under the chairmanship of Dr.S.Radhakrishnan. It aimed to improve the quality in higher education.

Dr.Radhakrishnan's birthday is celebrated as "Teachers day" on 5th September every year.

The Article 45 of the Constitution of India guaranted free and compulsory education for children below the age of 14.

Secondary Education Commission (1953): Under the chairmanship of Dr.A.Lakshmana swamy Mudaliar, the Secondary Education Commission was constituted in 1953. It insisted on the all round development of the child at the secondary level. It suggested that the secondary education should be a preparatory stage for higher education.

Kothari Commission (1964): The Kothari commission otherwise known as National Education Commission was appointed under the Chairmanship of Dr.D.S.Kothari in 1964. It submitted its report in 1966. The report suggested the introduction of 10+2+3 pattern of education in all parts of the country. It also emphasised on vocational, technical and science education. Accordingly, in the year 1965, the three language formula was adopted in the education system of Tamilnadu.

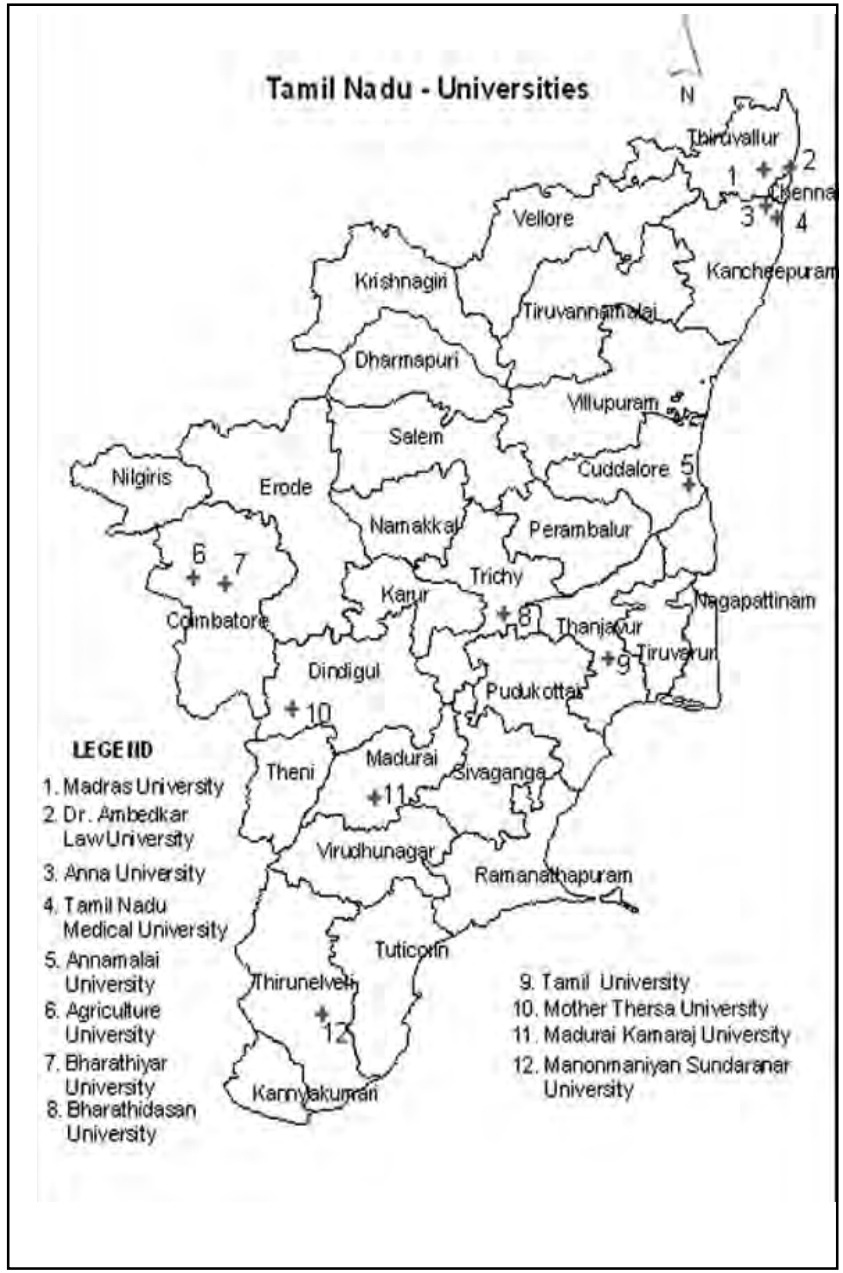
New Education Policy (1986): New Education Policy of 1986 gave more emphasis on human development. The policy aimed for the removal of social disparities by giving importance to education of women, scheduled castes, scheduled tribes, handicapped and minorities. Further, the policy insisted on universalisation of primary education enrolling all the children of the age 6-14 years. The policy also aimed for the protection of nature by infusing environmental consciousness in the minds of the students.

National Policy on Education (1992): This Educational policy introduced a programme called 'Operation Black Board' for providing basic infrastructure facilities in schools. Another programme called National Literacy Mission (NLM) under Non-Formal education was enacted to remove illiteracy among the adults. It also aims for the eradication of poverty and unemployment and there by enhancing the economy of the country.

Growth of Primary Education: In the field of primary education our state has achieved a remarkable progress. During 1949-50 the total number of elementary schools were 15,303. The number of primary schools in Tamilnadu increased from 30,844 in 1999 to 32,242 in 2003-2004 budget. In order to improve the quality of education and to avoid dropouts at the primary level the Government of India introduced a scheme called 'Sarva Sikshya Abhyan' (SSA). This scheme is being implemented in Tamilnadu successfully.

Growth of Secondary Education: The secondary education is a link between the primary education and the higher education. In the year 2003 , nearly 4859 secondary schools were functioning with 68,212 teachers in Tamilnadu. The National policy of education (1992) emphasised the need for introducing vocational education. On the basis of this policy, the Government of Tamilnadu introduced the vocational education in June 1978. At present many vocational subjects are taught on different areas like Agriculture, Home Science, Engineering etc.

Growth of Higher Education: Since Independence, the growth of higher education received considerable encouragement. Higher Education can be classified as General and Professional education. The General education consists of disciplines like Arts, Science,Commerce etc. The Professional education is comprised of courses on Engineering, Medicine and Agriculture.



To cater the needs of the students of the above two categories large number of colleges and universities were established in Tamilnadu. In 2002-2003, there are 478 arts and science colleges and 16 universities in Tamilnadu. The Tamil language was introduced as a medium of instruction in the colleges of Tamilnadu in 1970.

Science and Technology: Tamilnadu is famous for producing very great scientists to the country. The state contributes immensely for the rapid growth of science and technology in India. Famous scientists like Ramanujam (Mathematics) Dr.Sir CV.Raman (Physics) Dr.Chandrasekar (Physics) Dr.A.P.J.Abdul Kalam (Space) belong to Tamilnadu.

Dr.Sir C.V.Raman and Dr.Chandrasekar were the noble prize winners.

Agricultural Research : Dr.M.S.Swaminathan, famous agricultural scientist of the world belonged to Tamilnadu. He reorganised the Indian Council of Agricultural Research (ICAR). He evolved new technologies for the production of rice. It is called High Yielding Variety Programme (HYVP). The Agricultural Universities in Coimbatore, Agricultural Colleges at Madurai and other places have done lot of research on agriculture.

Farmer's day is celebrated on December 23rd every year.

Industrial Research: The Council of Scientific and Industrial Research (CSIR) has established a vast network of laboratories and research institutions all over the country. Dr.G.D.Naidu was the famous Industrialist of Tamilnadu. Many industries sprang up in Coimbatore, Chennai, Trichy, Salem, Mettur, Tirunelveli etc.

Atomic Research: The Atomic Energy Commission (AEC) was established in 1948 for the development of Atomic energy. Kalpakkam near Chennai is the centre of Atomic Research in Tamilnadu. Dr.Chidambaram who was well known as an Atomic Scientist hails from Tamilnadu. An Atomic plant at Koodangulam in Tirunelveli district is contributing a lot in the field of Atomic research.

Space Research: The Indian Space Research Oraganisation was founded in 1972 to utilise the space technology for National projects.

Dr.A.P.J.Abdul Kalam, his Excellency, the President of India father of Agni missile authored a book called 'wings of fire'.

Mahendra giri in Kanyakumari district, a unit of Indian Space Research Organisation (ISRO) is doing well in this field. 'Kavalur' in Vellore district has a very big 'Telescope" in South East Asia This space observatory is doing remarkable research. In Chennai the Birla Planetarium is spreading scientific knowledge among the students.

Newspapers: Mass Comunication plays an important role in creating an awareness in the minds of the people. The mass communication includes the newspaper, radio, television, telephone, etc. The newspapers are the powerful media in influencing the opinion of the masses. Besides there are number of weekly, fortnightly, monthly quarterly and annual periodicals. The above mentioned newspapers and periodicals reflect the socio-political life of the people. They also serve as a link between the government and the public. Hence they provide us literary and informative values.

Radio: Radio broadcast was started in India in 1927. The Government of India took over the transmitters and started operating the Indian Broadcasting service in 1936. The name was changed as 'All India Radio' (AIR). Further, All India Radio established broadcasting centres at Trichi, Madurai, Kovai and Tiruneveli etc. The AIR is serving as an important media in providing information and in educating the people. The Prachar Bharathi, a unit of Government of India is formulating the policies for information and broadcasting and implementing it. Apart from this, there are private music channels also broadcast their own programmes in Tamilnadu.

Television: Television is one of the wonders of science. It was introduced in India in 1959. The television station at Madras was inaugrated in 1975. This visual medium makes an effective impact in

the minds of the young and old generations. It help us to know the art,architecture, music and the life in the various regions in our country.

Television was invented by J.L.Baird

A multi-purpose satellite called INSAT was introduced in India. It is used for the telecommunication, meteorology and radio besides television, live telecast of National and International events help us to have a closer intimacy with the people of the world. Thus, television not only educates the masses, but also helps the students to acquire vast knowledge in all fields.

Telephone: The progress of telephone and telegraphs marks an important era in the history of telecommunication. Telegraph was invented by M.Lammond of France in 1787. Lord Dalhousie introduced the telegraph system for the first time in India in 1857. At that time 753 post and telegraph offices were opened throughout India. The people utilised the benefit of telegraphs to a great extent. The development of telegraph resulted in the progress of the telecommunications.

Telephone was invented by Alexander Graham Bell of USA in 1876.

The people began to make use of the telephone in the 20th century. The first telephone in Madras was introduced in the year 1882. The Telephone industries were started after independence. The Government of India started the first telephone industry in Bangalore. Bharath Sanchar Nigam Limited (BSNL) of India provides excellent service to the people. In the private sector more telephone industries were founded in various places. Telephones are manufactured by the different groups like, TATA, BPL, BEETEL, etc. As on 2001 more than 1513 telephone exchanges were functioning in Tamilnadu. The total telephone connection in Tamilnadu as on 2001 are 15,82,540.

Computer: Generally, any device that can perform numerical calculations even an adding machine, an abacus, or a slide rule may

be called a computer. Currently, however, the term usually refers to an electronic device that can use a list of instructions, called a program, to perform calculations or to store, manipulate, and retrieve information. In 1953 there were only about 100 computers in use in the entire world. Today hundreds of millions of computers form the core of electronic products, and tens of millions more are used in homes, businesses, government offices, and universities for almost every purpose.

Computers come in many sizes and shapes. Computers are designed to perform specific tasks. Their operations are limited to the programs built into their microchips. These computers are the basis for electronic calculators and can be found in thousands of other electronic products, including digital watches and automobiles.

Tamilnadu is one of pioneer and leading state in India in the field of computer education. To promote the computer education, the Government of Tamilnadu donated free computer to government schools under the computer literacy programme. Besides the government encourages the private entreprenuers to invest in Tamilnadu to develope the software industry. In order to attract the investers, complexes such as Tidal parks are opened at Chennai and also at Nanguneri in Trinelvelli district.

Tamil Nadu occupies the second place in India in the import of software materials.

Internet: Today rapid changes are taking place in the information technology. In the field of computers the Internet plays a significant role. It was conceived in the form of computer net work in USA (MIT) in 1962. It was improved in the year 1969. By the Defence department of USA, academic and technological information were integrated. The computer net works in USA help us to make more research on the internet.

Through internet, E-commerce, are taking place for the benefit of the trading people. For the betterment of the administration, Tamilnadu Government has introduced E-conference method for executing the Government schemes promptly. In the judiciary also E-conference is being adapted. So Internet plays a vital role in all walks of life of the people.

Learning Outcome:

1. **Acquired knowledge about the progress of education, science and technology in Tamilnadu.**
2. **Understood the role of media and its merits.**
3. **Able to describe the developments in Tamilnadu after independence.**

SELF EVALUATION

I. Choose the correct Answer:

1. The Secondary Education Commission was appointed under the chairmanship of
   a) Dr.Radhakrishnan (b) Dr.Lakshmana Samy Mudaliar
   (c) Dr.D.S.Kothari (d) Dr.Chandrasekar.
2. The Tamil language was introduced as a medium of instruction in the colleges of Tamilnadu in the year :
   (a) 1980 (b)1970 (c)1991 (d)1978.
3. Father of Agni Missiles is:
   (a) Dr.Swaminathan (b) A.P.J.Abdul Kalam
   (c)Sir C.V.Raman (d) G.D.Naidu
4. The position of Tamilnadu in the export of software in India
   a) First place (b) Second place (c) Third place
   d) Fourth place.
5. Telephone was invented by:
   (a) Alexander Fleming (b) Harvey (c) Alexander Graham Bell
   d) Liou Faster.

II Fill in the Blanks:

1. Dr. Radhakrishnan's birthday is celebrated as ----------.
2. The ---------- introduced the programme called 'Operation Black Board'.
3. ---------- of Tamilnadu was the famous agricultural scientist of the world.
4. Radio broadcast was started in India in the year ---------.
5. Television was invented by ----------.

III Match the following:

1.	Dr.Sir C.V.Raman	Multi purpose satellite.
2	.Kalpakkam	Telescope
3	.Kavalur	Atomic Power station.
4.	Birla Planetarium	Noble Prize Winner
5.	INSAT	Chennai

IV Answer the following briefly:

1. Write a short note about the growth of primary education in Tamilnadu.
2. Mention the four names of scientist who belonged to Tamilnadu.
3. What is INSAT?
4. What are the Mass Medias?
5. What is the role of Internet in Tamilnadu?

V Answer in Detail:

1. Explain the Growth of Higher Education in Tamilnadu.
2. Estimate the role of Television.
3. Explain the various steps taken in the Agricultural Research in Tamilnadu
4. Explain the development of Science and Technology in Tamilnadu.

Practical Activities

1. Make a visit to the Birla Planetarium with the help of your teachers.
2. Collect the picture of famous scientist display it in your class room.
3. Make a visit to the Tidal Park with the help of your teachers.

8. ECONOMIC DEVELOPMENT IN TAMILNADU

Learning objectives

1. **Acquires knowledge about the economic development.**
2. **Understands the importance of planning.**
3. **Understands the development of agriculture and irrigation.**

Economic development is an important continuous process in the progress of the country. At the time of independence, the status of Indian economy was poor and backward. So, we adopted planning as one of our approaches to economic development. The anti Indian Policy of the British rule was the main reason for the backwardness of the Indian economy. Hence, the planning in India aimed to channelise the country's resources in different developmental activities.

Plan Periods

The Government of India appointed a Planning Commission in 1950 to prepare a blue print for the development, taking an overall view of the needs and resources of the country. The then Prime Minister Jawaharlal Nehru was its first Chairman. The Planning Commission fixed the planning period as five years. Since, then nine FiveYear Plans were implemented. All these plans have objectives. They are:

(i) High rate of growth

(ii) Promotion of social justice

(iii) Self-reliance

(iv) Increasing the employment opportunities.

Almost all the plans have successfully implemented these objectives and thereby enhanced the status of the economy of our country.

Plan		Period
I	Five year plan	1951-56
II	Five year Plan	1956-61
III	Five year plan	1961-66
	Annual plans	1967-69
IV	Five year Plan	1969-73
V	Five year Plan	1974-79
VI	Five year Plan	1980-85
VII	Five year Plan	1985-90
VIII	Five year Plan	1992-97
IX	Five year Plan	1997-2002
X	Five year Plan	2002-2007*

*Is under Progress

Industries:

The important aspect of economic development is the expansion of Industrialisation. Since Tamil Nadu is an agricultural state, priority for Industrial development was given only during the Second Five Year Plan. R.Venkataraman (Former President of India), the then minister for Industries in the Kamaraj Ministry took pioneering steps to make Tamil Nadu as one of the top most industrial states in India.

Heavy Industries: With the dawn of planning the tempo of industrial development especially the heavy industries received momentum not only in India but also in Tamil Nadu. The most popular heavy industries

Coimbatore is called the Manchester of South India.

in Tamil Nadu are Iron and Steel, Cotton textiles, Sugar and Cement etc. The cotton textile industries at Coimbatore, Ambattur and Ambasamudram were prominent. The Cotton Textile industry is one of the oldest industries of the state.

Another ancient industry is the sugar industry which enhance the national income of the country. The important sugar factories are situated at Nellikuppam, Trichy, Coimbatore, Madurai, Tanjavur, Villupuram, Moganoor etc. At present there are 37 sugar factories in the state. With the development of Paper Mills, Printing machines started progressing. Paper Mills at Sivaganga, Theni, Thirunelveli, Pugaloor are noteworthy. The Cement industries are found in the areas where lime stone is found in abundance. Cement is an essential commodity which is used for the construction purpose such as house buildings, bridges, dams, etc. The most famous cement industries in the state are the Sankar Cement in Thazhayuthu, Madukarai Cement, Chettinad Cement and Dalmia Cement at Dalmiapuram.

During 1970's the above traditional industries lost their importance. But industries like Chemicals, Fertilizers, machine tools and transport equipments started flourishing in Tamilnadu. The chemical industries manufacture fertilizers and pesticides. The famous chemical industries are at Ranipet, Thiruvallur, and Tuticorin. The machines and machine tools are produced by the Metal Industries at Salem, Tanjore, Karaikudi and Chennai. There are number of vehicle industries in Chennai, important among them are TVS, Ashok Leyland, Hyundai, Mahindra Ford etc.,

Chennai is called the Detroit of Tamilnadu

Cottage and Small Scale Industries: The Cottage and small scale industries hold a very important place in our economy. Cottage industries are mostly traditional, producing traditional products by employing traditional methods. The small scale industries are identified on the basis of capital investment. The most popular small scale and cottage industries in Tamilnadu are Match box industry, Coir industry, Palm industry, Khadi industry etc. They are set up in Chennai, Ranipet, Arakonam, Sivakasi, Karaikudi, Trichy, Hosur, Marthandam etc.

In order to encourage the small scale industries, the Government of Tamilnadu established some of the corporations like State Industries Promotion Corporation Of Tamilnadu (SIPCOT), Small Industrial Development Corporation (SIDCO) Tamilnadu Industrial Development Corporation, (TIDCO) and Tamilnadu Industrial Investment Credit Corporation (TIIC). Thus, the industrial development in Tamilnadu made the state as one of the most industrialised states in India.

Tamilnadu occupies the second position after Maharashtra in the field of Industrial development in India.

Following are the most popular industries establsihed by the Central Government in Tamilnadu.

	Project	**Location**	**Year of Establishment**
(i)	Integral Coach Factory	Perambur, Madras	1955
(ii)	Neyveli Lignite Corporation	Neyveli	1956
(iii)	Hindustan Teleprinters Ltd	Madras	1960
(iv)	Hindustan Photo Films	Udhagamandalam	1960
(v)	Bharath Heavy Electronics	Tirchirapalli	1960
(vi)	Heavy Vehicles Factory	Avadi, Madras	1961
(vii)	Madras Refineries Ltd.	Manali, Madras	1965
(viii)	Steel Authority of India ltd.	Salem	1977

Electricity: The history of power generation in Tamilnadu received importance during the Second and Third plan periods. The Tamilnadu

Electricity Board was formed on 1st July, 1957 as a statutory authority under the Electricity (Supply) Act, 1948. It took over the functions of generation and distribution of power. A number of sizeable new projects such as Kundah (Hydro), Ennore, (Thermal) Mettur (Hydro) and Neyveli (Thermal),Papanasam (Hydro), Pykara (Hydro) and Kalpakkam (Atomic) were established. More than 75% of the households in Tamilnadu use electricity as a source of light. The urbanised districts like Chennai, Kancheepuram and Coimbatore have returned higher proportion of electrified households. At present more than 21 power projects exist in Tamilnadu. The power is used for various purposes -domestic .industrial agricultural and water supply.

Trade and Commerce: The development of trade and commerce is one of the indicator of economic growth of a country. There exists two types of trade. If the goods and services are exchanged within the same political boundaries it is called internal trade. On the other hand, if the goods and services are exchanged beyond the political boundaries of countries or when it is among different nations of the world, it is called International trade. The most important exports of Tamilnadu are raw materials, cotton and silk clothes, spare parts, vegetables, rice, consumables, packing materials,milk products etc. Some of the important imports are non-electrical machinery, petroleum, and allied products, pharmaceuticals machine tools etc.

The Governemnt of Tamilnadu has formed the Madras Chamber of Commerce in 1836, which became the Madras Chamber of Commerce Industry (MCCI) in 1966. This attempts to promote trade and commerce in the state to cope with the demands of the global market. In this connection, the State Trading Corportaion (STC) was set up in 1956. The Government of Tamilnadu adopted the open door policy to foreign investments into the state.

Madras Export Processing Zone (MEPZ) is one of the seven export processing zones set up by the Indian Government in Chennai

Banks: Banks are the life blood of modern commerce. They are the institutions which deal finance and credit. They play a major role in the development of our economy. The banks perform two main activities such as:

(i) Accepting various kinds of deposits from the public.
(ii) Lending money by way of loans.

The three different kinds of Banks are (I) Public Sector Banks (ii)Private Banks (iii) Co-operative Banks.

The State Bank of India is doing valuable service to the people. The process of nationalisation of banks began with the Reserve Bank of India Act of 1948. All the Nationalised banks are called Public Sector banks. They are 14 in number and are functioning under Reserve Bank of India. The popular nationalised banks are Indian Overseas Bank, Indian Bank, Canara Bank, Syndicate Bank, Bank of Baroda, Punjab National Bank, Bank of India and Central Bank etc. Many Private Banks like ICICI, HDFC, Karur Vysya Bank, Lakshmi Vilas Bank and Kumbakonnam City Union Bank etc also came into existence. Many foreign banks like City Bank, Grindlays Bank and Bank of America etc are working smoothly. The Co-operative Banks are functioning under the control of the Tamil Nadu Co-operative Society Act. The most popular is the Tamilnadu State and Apex Co-operative Ltd.

The process of nationalisation of banks began with the Reserve Bank of India Act of 1948.

Transport

Roads: Transport is one of the important means of communication. for the development of the country. A number of roads were laid to connect even the remote villages of Tamilnadu, since independence . High priority was given to rural roads in the Fifth Plan under 'Minimum Needs Programme'. Roads are being constructed under RLEGP and

NREP now merged with Jawahar Rozgar Yojna. The National Road Transport Development Corporation was formed to meet the financial requirements of State Road Transport Corporations. With the financial support of the World Bank and NABARD, number of National highways, State highways and Ring Roads were laid in Tamilnadu. Besides, the Government of Tamilnadu spent more than 75 crores of rupees for the development of East Coast, West Coast and By-pass Roads.

Indian road network is one of the largest in the world.

At present 21 transport corporations named after the important leaders in Tamilnadu were removed and were renamed as Tamilnadu State Transport Corporation.

Agriculture: Agriculture is the corner stone of our economy. It is the sector in which the majority of people earn their livelihood. Hence, the primary concern of the First Five year plan was agricultural development. Later promotion of intensive cultivation was realised, thus Intensive Agricultural Area Programme was introduced in Tanjavur, Chenglepet, Madras, Coimbatore and Tirunelveli district.

The Moffusil Bus stand in Chennai (Koyambedu) was constructed in 2003 is the biggest bus terminus in Asia.

It was subsequently extended to all the districts of the state. In due course of time Government introduced a new strategy called 'Green Revolution' in 1965, for the adoption of latest, scientifc methods of cultivation. The technological break through achieved in the mid sixties increased the agricultural production particularly paddy and food grains. Besides Green Revolution the Government has adopted many schemes for the development of agriculture (1) Plant Protection Schemes are implemented for the protection of plants from pest and diseases (2) the rotation of crops is the system of farming by which crops are repeatedly grown in the same land. This helps in checking the exhaustion of the soil and maintaining its fertility. (3) Intensive agriculture is a

system of farming in which the cultivator produces more by working hard and making use of better agricultural means.

Irrigation: Irrigation increases the productivity of land and enables the growth of more remunerative crops. The main modes of irrigation in Tamilnadu are rivers, tanks and wells. Streams and spring channels are other sources of minor importance. Tanjavur, Coimbatore, Erode, Trichirapalli, South Arcot, Madurai are the districts accounting for the irrigation facilities. These are the districts watered by major rivers such as the Cauvery, Parambikulam-Aliyar, Palar, Pennaiyar and Vaigai.

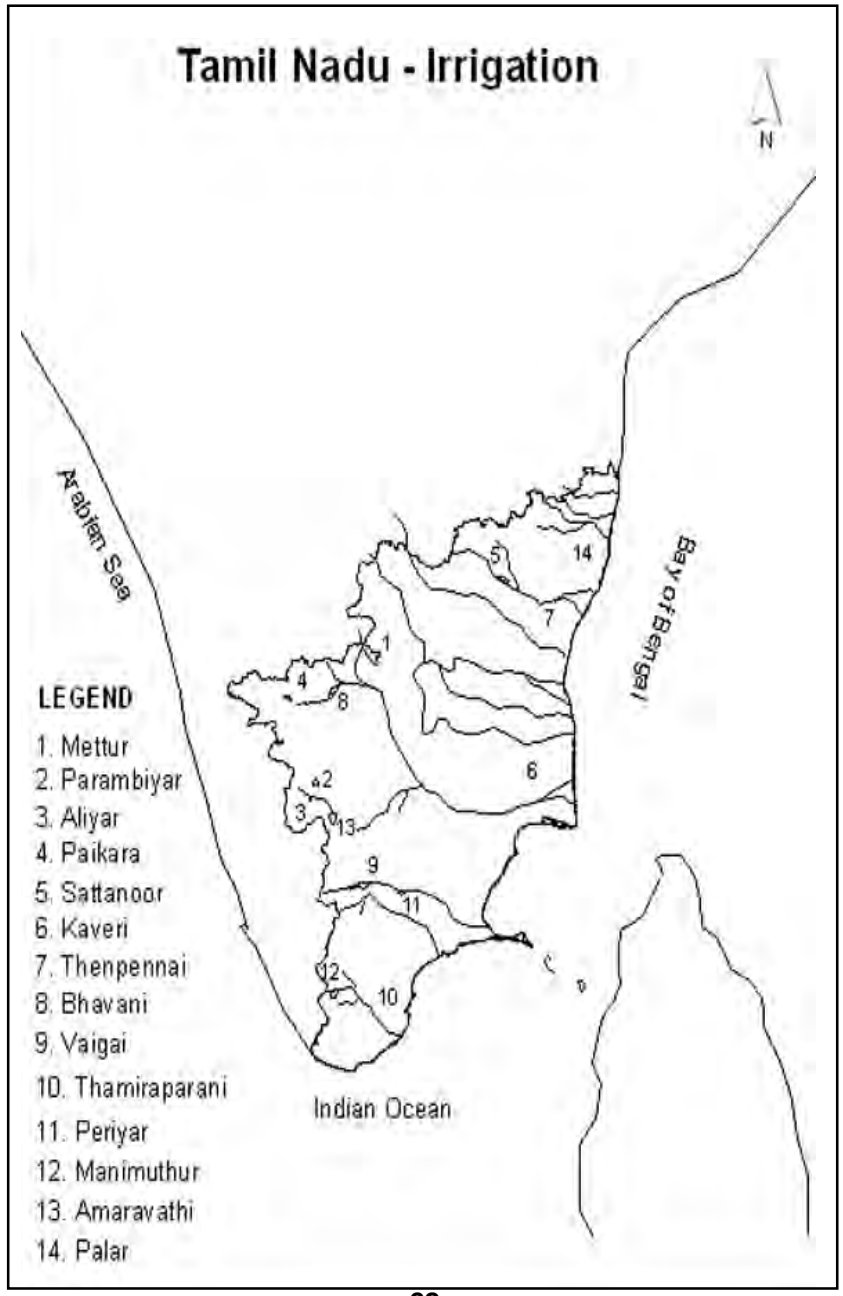
The most important river basin in Tamilnadu is the Cauvery basin. Extending over an area of 88,000 square kilometers, it is shared among Tamilnadu, Karnataka and Kerala. Since independence number of irrigational projects have been constructed. The important among them are, lower Bhavani, Parambikulam-Aliyar, Amaravathi, Krishnagiri, Sathanur, Vaigai, Mettur, etc.

Thus the economic development of Tamilnadu in the post independence period, no doubt shows a progressive trend in all the fields.

Food Grains: The main objective of our food policy is to supply food grains at reasonable prices to the poor sections of the society through public distribution system. The state has made a significant progress in the production of food grains since 1960. The important food grains in Tamilnadu are Rice, Ragi, Wheat, Cereals, Pulses, Millets, Maize etc.

At the All-India level Tamilnadu leads in respect of Paddy and Rice, it stands second in the production of Jowar and third in terms of millets.

The High Yielding Variety Programme (HYVP) of 1966-67 led to the cultivation of new varieties of paddy, wheat, cereals and pulses. The Government of Tamilnadu is supplying food grains at fair prices through the co-operative societies.



Learning outcome

1) **Understood about the Economic development of Tamilnadu after Independence.**
2) **Understood about the Five year Plan.**
3) **Understood about the development of Agriculture and Irrigation in Tamilnadu.**

SELF EVALUATION

I . Choose the correct answer:

1) The Government of India appointed a Planning Commission in the year
   a) 1960 (b) 1971 (c) 1947 (d) 1950
2) The Manchester of South India is
   a) Chennai (b) Kancheepuram (c) Coimbatore (d) Sivakasi.
3) The Tamilnadu Electricity Board was established in
   a) 1978 (b) 1957 (c) 1948 (d) 1984
4) The Detroit of Tamilnadu is
   a) Madurai (b) Chennai (c) Tirchi (d) Coimbatore.
5) The most important river basin in Tamilnadu is
   a) Vaigai (b) Pennaiyar (c) Cauvery (d) Palar

II Fill in the blanks:

1) Integral coach factory is at ----------.
2) Electricity supply Act was passed in the year ----------.
3) Green Revolution was introduced in the year ----------.
4) --------- is the biggest bus terminus in Asia.
5) In 1966 ----- was founded to promote trade and commerce.
6) ---------- is the Granary of Tamilnadu.

III Match the following

1) Nellikuppam — Vehicle Industry
2) Udagamandalam — Sugar Industry
3) Manali — Paper Industry
4) Hyundai — Madras Refineries
5) Pugaloor — Hindustan Photo film

IV Answer the following briefly:

1) What are the major objectives of our Planning?
2) Where are the sugar factories located in Tamilnadu?
3) Mention some of the industries undertaken by the Central Government.
4) What is Green Revolution?
5) Write a note on the food grains of Tamilnadu.

IV Answer in detail.

1) Write about the cottage and small scale industries in Tamilnadu?
2) Write a paragrah about the Transport development in Tamilnadu?
3) Write a note on different types of banks and their functions in Tamilnadu?
4) What do you know about the agricultural development in Tamilnadu?

PRACTICAL ACTIVITIES

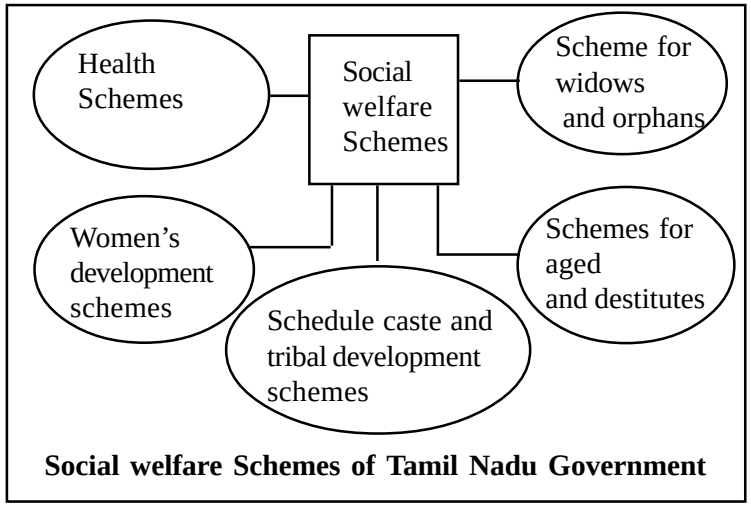
1) Prepare a chart showing the period of Five Year Plans.
2) Mark on the outline map of Tamilnadu the important industrial cities of Tamilnadu

9. SOCIAL WELFARE SCHEMES OF TAMILNADU GOVERNMENT

Learning Objectives

1) **Acquires knowledge about the social welfare schemes of Tamilnadu Government.**
2) **Understands the beneficiaries of various schemes of the Tamilnadu Government.**
3) **Understands the welfare schemes on women and child care.**

The Government of Tamilnadu has been implementing various social welfare schemes for the upliftment of downtrodden community. In order to promote the welfare programme the Government of India established the Central Social Welfare Board in 1953 during the First Five Year Plan. On the basis of this, the Tamilnadu State Social Welfare Board was established in 1954. This social welfare board has



Social welfare Schemes of Tamil Nadu Government

undertaken many programmes for women,children, scheduled caste, scheduled tribes and orphans.

Health: Health is now considered as the fourth minimum need next to food, shelter and clothing. The proverb "Health is Wealth' insist on the importance of health. As sound health is being viewed as an integral part of the human development, the Government of Tamilnadu has envisaged to provide "Health coverage for all". This scheme provides better health care to all more particularly underprivileged and downtrodden people. A significant reduction in Infant Mortality Rate from 51 per thousand live births in 2000 to 44 per thousand live births in 2002 is a clear indicator on the progressive health profile of the state.

The Director of Medical and Rural Health services is in-charge of planning and execution of all programmes of Medical services in the Districts. The Director of public health is in charge of planning and formulation of various programmes to prevent diseases in rural and urban areas.

World Health Day is celebrated on April 7th every year

Curative and preventive health care facilities in rural areas are available through a net work of Primary Health Centre (PHC), sub-centres, mobile Medical units and Mini Health centers. Some of the Health Scheme of Tamilnadu are:

1. The Multipurpose Health Workers scheme for a better organisation in the delivery of health care services including maternity and child health, immunisation services is implemented in 1977.
2. The Expanded Programme of Immunisation (EPI) implemented in Tamilnadu in 1979, aims at preventing the seven major childhood diseases namely, diptheria, tetanus, Measles, T.B, Polio, etc.

3. The common communicable diseases like Malaria, Filaria, T.B are eradicated through individual programmes. National Malaria Eradication Programme (NMEP), National Filaria Eradication Programme (NFEP), National T.B control programme, Leprosy control programme are undertaken as centrally sponsored schemes in Tamilnadu.

Hospitals:

1. The Government is committed to provide facilities in the important hospitals in the state to compete with standard private hospitals. The Government has chalked out a plan to provide services to patients who come from foreign c ountries. It has established hospitals for providing treatment on the basis of Indian medical methods like Unani, Ayurvedha, Siddha. Ultimate health destination scheme of 2003 aims to provide good health for all.
2. At present 25 operation t heatres in 20 District Headquarters hospitals and 64 operation theatres in 6 4 Taluk Headquarters. Hospitals have been provided with air-conditioning facilities.
3. With a view to impart proper nursing care to rural public and provide opportunity to students from rural area to take nursing

Government General Hospital

profession as a career, seven new schools of Nursing have been started.
4. The Directorate of Indian Medicine established by the Government of Tamilnadu has been rendering enormous

service. There has been numerical increase in the number of hospitals and dispensaries in Tamilnadu particularly in rural areas.


CMC Hospital- Vellore

According to the statistics of 2000, there are 52,237 hospitals which includes Government hospitals, Private hospitals and Primary health centres in Tamilnadu.

Maternity and Child Care: A very high priority is given to Maternity and Child Health (MCH) services to cover the valuable sections of the society consisting of women in the child bearing age of 15 to 45 years and children below 14 years. The maternity services comprise anti-natal, intra-natal and post-natal care to the mother and infants. These services are rendered to the pregnant and lactating mothers and children through immunisation,medical care and nutritional facilities.

The school health service scheme was started in 1964, aims which to provide pre-school and school health care programme to children so as to minimise sickness and death among them.

Tamilnadu is one of the First state to take note of the basic relevance of family planning. The sterilisation programme was started in 1956 as a means of controlling the birthrate.

In this regard, in 1989 “Muthulakshmi Reddy Ninaivu Makapperu Udavi Thittam” was implemented. It provides cash support to the women from poor households in the last two months of pregnancy

and immediately after two months of delivery of the child. The number of women beneficeries under this scheme increased steadily.

Women's Development Schemes: The Tamilnadu Government is providing more and more facilities, financial and other assistance to women for their empowerment. In order to implement welfare schemes, Women's welfare Department was established in 1947. The Five Year Plans have consistently placed special emphasis on providing minimum health facilities and welfare service for women. The most important schemes on women are:

i. Mahila Mandal programme was undertaken for creating awareness among women.
ii. To increase the active participation of women in decision making, "Awareness Generation Programme for Rural Women" was implemented.
iii. Support to Training and Employment programme for Women was started in 1986 with the objective of rendering support to women's employment in various sectors.
iv. Moovalur Ramamirtham Ammaiyar Memorial Marriage Assistance Scheme was introduced in 1989. Under this scheme Rs.5000 is given as financial assistance for the marriage of poor women who have studied upto 8th standard. Now this scheme is restructed as Rs.10000 and who have studied up to 10th standard.
v. To safeguard the rights of women, the Tamilnadu State Commission for Women was set up in 1990.

Thus the programmes for Women received priority in the government schemes.

Scheduled caste and Tribal Development Schemes: The Government of India, particularly the Government of Tamilnadu has taken several steps for the welfare of socially disadvantaged groups of schedule caste and schedule tribes. The Constitution of India grants equality of opportunity in the matters of education and employment to the schedule cast and schedule tribes. Dr.B.R. Ambedkar took serious efforts to provide social security to them.

The schedule caste and schedule tribe population constitute nearly 20.04% of the Tamilnadu state population. Among this 70% of the scheduled caste and 85% of the scheduled tribe live in rural areas. Hence constant special focus for their socio economic advancement is necessary. By realising the need various welfare schemes were implemented to ensure the speedy development of Adi Dravida and tribal people. The Major activities are:

1. Education Development
2. Economic Development
3. Special plans for AdiDravida and tribals.
4. TAHDCO - Economic programme for the benefit of scheduled caste and scheduled tribe.

The literacy level of the scheduled caste and scheduled tribe is very low when compared to general literacy rate. So the government concentrated on the education of these sections and sanctioned a sum of Rs.448.91 crores in the Budget (2004 - 2005). At present nearly 1018 AdiDravida Welfare schools and 277 Tribal Residential schools are functioning in Tamilnadu. To induce the eagerness of students in computer science, 31 high schools have been supplied with computers. 42 AdiDravidar Welfare high schools have been equipped with laboratory buildings and the students are totally exempted from tuition fees.

Free education is provided up to degree level for the SC's and ST's

The Tamilnadu Adidravida Housing Development Corporation (TAHDCO) has been functioning since 1974. The technical wing of this corporation is executing the construction works such as hostels, school buildings, class-rooms, etc. The development wing of the corporation is implementing Welfare schemes for their upliftment. This corporation formulate need-based economic activities so as to bring about better standard of living.

Tribal Welfare: A separate Directorate has been functioning for the Welfare of Tribes since 2000. It pays special attention to 13

districts where ST's are more in number. Out of the 36 scheduled Tribe communities in the state, 6 tribal communities : Toda, Kota, Kurumba, Irular, Pania and Kattunaicken have been identified as primitive tribal groups. Through Integrated Tribal Development programme these communities are given special focus.

To empower the Tribal Women, emphasis is laid on Self Help Groups. Through the (ICMR) Indian Council of Medical Research Project in 2002, due medical care is given to the primitive tribes. Hill areas Development Programme (HADP) is implemented for the welfare of tribes residing in Nilgiris District.

To abolish untouchability and prevent atrocities against Adidravidar and Tribals, the protection of Civil Rights Act 1955 and the Scheduled caste and Scheduled Tribe prevention of Atrocites Act of 1989 are effectively implemented in the state. Thus various measures adopted by the government for the welfare of Schedule castes and Schedule tribes, enlightened their social status in the state.

Schemes for the Aged: To provide social security to the old age people, the government has enacted various schemes. The pension schemes involving monthly recurring payments consist of 5 types. They are:

i. **Old age Pensions - Normal scheme (1962).**
ii. **Physically handicapped pensions (1974).**
iii. **Destitute Widow's Pensions (1975)**
iv. **Destitute Agricultural Labourers Pension (1981).**
v. **Destitute deserted wife's Pension (1986).**

The beneficiaries of the above schemes are paid Rs.200/- every month. The pensions are disbursed to the beneficiaries at the beginning of the month. Besides, the beneficiaries are given free dhoti, saree, and free meals from the Nutritious Meal Centres. Apart from this, the Ministry of Rural Development has implemented a 'Food Supply scheme' knows as "Annapurna Scheme" to provide food security to the senior citizens who have no income of their own and none to take

care of them. Number of Old Age Homes were established both by the government and voluntary organisations to help the old age people.

Schemes for destitute: The Government of Tamilnadu established the Directorate of Rehabilitation, for handicapped in 1992. To provide equal opportunity and social security to the physically challenged, the government passed the act for physcially handicapped in 1995 with the financial aid of the government. Nearly 25 special schools were started throughout the state for the physically challenged children. They were also given free education, food, shelter and scholarships.

They were given 3% reservation in the educational and government institutions in the educational and employment opportunities. They were given special training in the technical wings, and were given free equipments. Above all, with the aid of Central Government, National Programme for rehabilitation of persons with disabilities was implemented in 2003 at Theni, Kanchipuram, Thiruvanamalai and Ramnad. The government also established 10 rehabilitation centers in the state, for the welfare of the disabled persons.

Schemes for the welfare of Widows: With the aim to cater the poor widows, deserted wives and destitute women in the age group of 18 to 40 years, 6 service homes were established by the government at Tambaram, Cuddalore, Salem,Thirunelveli, Thanjvur and Karikudi. The Dr.Dharmambal Ammaiyar Widows Remarriage Scheme was introduced in 1989 with a view to provide financial assitance of Rs.10,000/- for the marriage of the daughters of poor widows, besides the Mother Therasa Marriage Scheme was implemented for the financial assistance for the marriage of destitute women.

Recently in 2002, Government of India launched the 'Swadhar Scheme' for the benefit of widows and deserted women, under the scheme, women are given food, shelter, clothing, health care and counselling facilities for their social and economic rehabilitation.

Schemes for Orphans: The Government of Tamilnadu implemented various Projects for the orphans.

(i) Anandam is a project which aims to establish a library for more than one thousand children who live in orphanage.

(ii) Society for Economic and Educational Development helps children from the socially, educational and economically deprived segments.

(iii) WARD-Welfare Association of Rural Mass is an organisation established in 1983, to create awareness among the marginalised people.

There are number of homes for orphans run both by the government and voluntary organisations. The notable homes are Sivananda Gurukulam, Udavum Karangal, Sevalaya, Seva Nilayam etc.

Thus the Government of Tamilnadu enacted various welfare schemes for the different sections of society. The efforts made by the government enormously improved the socio- economic status of the people at large.

Learning Outcome

Pupil

1. **Acquired knowledge about the social welfare schemes.**
2. **Understood the beneficiaries of various schemes.**
3. **Undetstood the welfare schemes on women and child care.**

SELF EVALUATION

I.Choose the correct answer:

1) World Health Day is celebrated on
   a) 7th April (b) 14th November (c) 8th March (d) 2nd October.
2) "Muthulakshmi Reddy Ninaivu Makapperu Thittam" was implemented in the year
   a) 1979 (b) 1989 (c) 1990 (d) 2002
3) The old age pension scheme provides monthly pension
   a) Rs.400 (b) Rs.200 (c) Rs.100 (d) Rs.500
4) The scheme that provides food security to the senior citizen is called
   a) Mahila Mandal (b) Anantham (c)Annapoorna (d) Swadha scheme.

II. Fill in the blanks:

1) The Tamilnadu state social welfare was established in the year ……..
2) In 1990 ……was set up to safe guard the rights of women.
3) ---------- took serious efforts to provide social security to schedule caste and schedule tribes.
4) The Hill Area Development programme is implemented in ……..
5) Directorate of Rehabilitation for handicapped was established in ……..

III . Match the following:

1. Malaria	Food supply scheme
2. 1964	Tribal people
3. T A H D C O	Communicable disease
4. Irular	School health service scheme
5. Annapurna	Economic programme for schedule caste and schedule tribe.

IV Answer the following briefly:

1) Write a note on the schemes of the government to improve hospitals, that existed in Tamilnadu?
2) Who do you know about T A H D C O?
3) Mention the pension scheme for the old age people.
4) Briefly discuss the schemes implemented for the physically challenged.

V. Answer in detail:

1) What are the measures adopted by the government to provide health for all?
2) Describe the women's development scheme enacted by the government of Tamilnadu?

PRACTICAL ACTIVITIES

1) Pay a visit to an orphanage in your area.

10. DEVELOPMENT OF LITERATURE AND CULTURE IN MODERN TAMIL NADU

Learning objectives

1) **Acquires knowledge about the development of literature and culture in Tamilnadu.**
2) **Identifies the contemporary Literacy works.**
3) **Will be able to explain the contemporary developments in literature and culture of Tamilnadu.**

In the 20th century the Tamil literature particularly the prose, poetry and drama had received inspiration from the people. Many works were produced in these fields. Short stories, novels, dance, music, cinema also developed to a great extent . So the progress in the field of literature and culture played a significant role in the history of modern Tamilnadu . The literature is a source of history that transformed the life of the people of Tamilnadu. The development of literature witnessed the political, socio economic and cultural effects.

DEVELOPMENT OF PROSE

The famous Tamil scholar Dr.U.V.Swaminatha Iyer had contributed immensely for the development of Tamil literature. He gathered the old manuscripts of the Sangam age literatures and preserved them for future generation.

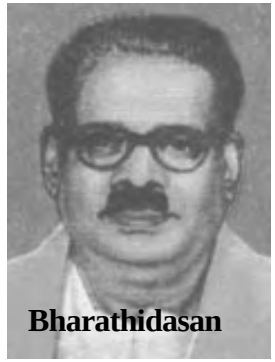
U.V.Swaminatha Iyer is called as "Grand Father of Tamil"

Maraimalai Adigal, a tamil scholar served a lot for the development of Tamil language. Poondi Ranganatha Mudaliar's Kachi Kalambagam, Thiru V.Kalyanasundranar's (Thiru.V. K.) Murugu and Pennin Perumai, Dr.M.Vardarasanar's "Agalvilakku" are worth mentioning.

Rajaji wrote Vyasar Virundhu and Chakravarthi Thirumagan Pandithamani Kathiresan chettiyar, Kangasabai Pillai, Ragava Iyyangar, Venkadasamy Nattar, C.N.Annadurai and Avvai Duraisami Pillai all contributed for the development of Tamil prose, Devaneya pavanar has brought out a Tamil dictionary called Agara Mudali.

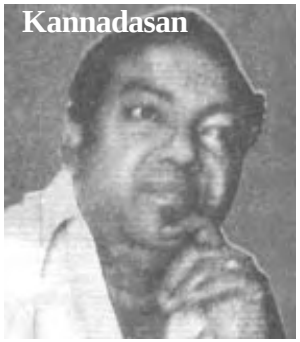
Progress of Tamil novel: Novel writing emerged in the later part of the 19th century. Vedanayakam Pillai's "Pradhapa Mudaliar Charitiram" was the first Tamil novel. Followed by this, many novels emerged in Tamilnadu. Historical novels were written by Kalki (alias) Krishnamurthy became very popular with the public, especially the novel titled **"Ponnyin selvan"**. Akilan, another famous writter who won the Gnanapeeda Award prize for his novel "Chthira Pavai". Chandilyan's 'Kadalpura' need special mention. Jayakanthan, T.Janagiraman, N.Parthasarathi, Sujatha, V.Kothainayaki Ammal, Siva Sankari, Indumathi, Lakshmi, Rajam Krishnan are some of the important novelists who concentrated on social themes. Besides detective novels were also written during the modern period. J.R.Rangarajan's 'Chandrakantha' is a very famous detective novel. Hence varieties of novels emerged during this period.

Poetry: Poetry, another form of literature attracted the attention of masses even before independence. The National poet Bharathi kindled the people of Tamilnadu through patriotic songs. NamakkalKavignar, Ramalingam Pillai, Kavimani Desiga Vinayagam Pillai, Bharathidasan wrote poems on the promotion of patriotism and women's liberation. In the recent years, Kannadasan, Vanidasan, Pulamaipithan, Pudumaipithan, Sujatha, Pattukottai Kalyanasundaram etc have immensely contributed for the growth of poetry in Tamil and most of them highlighted the social problems which prevailed in Tamilnadu. These poets no doubt created awareness in the minds of the people.



Bharathidasan

Short Stories: Pudumai Pithan's Sabavimochanam, Rajaji's Deivanai, K.P.Rajagopalan's Vidiyuma, Kalki's Thirudan, Annadurai's Rajapart Rangadurai etc are some of the important short stories deserve special mention.


Kannadasan

Dramas: Pammal Sambanda Mudaliyar was called the 'Father of Tamil Drama'. Some of the famous dramas were Manonmaniyam of Prof.Sundaram Pillai, Roopavathi of Suriya Narayana Sastri, Oru Eravu of C.N.Annadurai and Bombay mail of Krishnasamy Pavalar. The famous sanskrit drama of Kalidaas was translated into Tamil by Shankaradas Swamigal. T.K.S.Brothers, Rajamanikam and R.S.Manohar patronised Tamil drama.

Dance: Dance is one of the most famous cultural Contribution of the Tamils. Tamilnadu occupies an unique place in the development of fine arts. Dance originated and became part of the temple because its aim was to attain spritual identification with the eternal. The centre of all acts in Tamilnadu is Bhakthi or devotion. Classified as one of the oldest among all the contemporary Classical dance forms Bharathanatiyam holds a prominant place in our culture today. Bharathanatiyam was its origin in the manuscript called the Natiya shastra which was written by sage Bharatha aroud 4000 B.C. The word Bharatha interpreted as a dance form created by the sage Bharatha as within its essance and Uniqueness associated with Bharatha natiyam. Bha for bhavs or abhinaya and expression Ra for raga or melody and Ta for tala or rhythm. During this century the Bharatha natiyam


Bharatha Natyam

revolutionized and gained attention and regard in the socity as a classical art form.

Bharatha Natyam the popular form of dance left its imprints in India and abroad. In 1963, the Government of Tamilnadu established "Iyal, Isai, Nataka Mandram' to promote various fine arts. Besides, Kalakshetra, a private organisation was founded by Ruckmani devi Arundel at Chennai to promote the Bharatha natyam. The Nataraja temple at Chidambaram signifies the cosmic dance of Lord Shiva. The popular artists like Padmini, Padma Subramaniyam, Vaijayanthimala, Chithra Visveswaran, Sudharani etc gave more inspiration to the people to promote the culture of our land.

The Tamilnadu Iyal, Issai, Nattaka Mandram is honouring the artists by 'Kalaimamani' awards every year.

Apart from this, the folk dances are performed during the village festivals Karagattam, Mayilatam and Kummi are some of the examples for folk dances. Many sabhas are patronising the dancers even to go abroad and to bring fame and light to our culture.

Music: Music plays an important role in the cultural life of the people. Both vocal and instrumental music are familiar and famous during the modern period. There are three popular forms of Vocal music in Tamilnadu. They are Carnatic, Folk, and Light Music. In the 17th and 18th centuries the great musicians St.Thiyagaraja's, Muthuswami Dikshidar, Shyama Sastri patronised the Carnatic music. Many institutions like Madras Music College, Thiruvaiyaru Music School and Music Acadamy work for the promotion of Carnatic music. The famous carnatic singer of Tamilnadu M.S.Subbulakshmi, who sang kirthanas in United Nations Organisation. Chemmbai Vaidhya Natha Iyer, Balamuralikrishna, Semmangudi Sreenivasa Iyer, M.L.Vasantha Kumari, Maharajapuram Santhanam are Notable carnatic singers.

To promote Tamil music and its allied arts, the Tamil Music College was started in 1932 by Sir Annamalai chettiyar at Chidambaram. He also founded the Tamil Issai Sangam at Madras in 1943. Dr.A.C Muthiah the grandson of Sir Annamalai Chettiar felt the need of upgrading the music college into a full time college, which was born in the year 1955.

The Tamil Issai Sangam conducts annual music Festival for about 12-13 days during December and senior musicians besides aspiring youngsters are offerd chances to give concerts. On the inaugural day a famous exponent of Tamil music and culture is called upon to preside over the period of the festival and he is conferred the much- sought-after title "lsai peraringar".In 1993 the Golden jubilee of both Tamil lsai Sangam and that of Tamil Music Festival was Celebrated with great interest and enthusiam.

The folk music also attracts the attention of the people slowly and gradually. The famous personalities in this fields are Kollangudi karuppayi, Pushpavanam Kuppuswamy and Vijayalakshmi Navaneethakrishnan. Light Music is the most attractive form of music among the youth of Tamilnadu. T.M.Soundararajan, Seerkazhi Govindarajan, P.Susila, S.Janaki , S.P.Balasubramaniam, Jesudas etc contributed towards light music. The instrumental music is also encouraged. The Violin artists Kunakudi Vaidhyanathan, Veena Gayathri, Nathaswaram artists like Karakurchi Arunachalam etc need special mention in this regard.

Cinema: Tamilnadu was highly influenced by the cinema in the first half of the 20th century. It is considered to be the most powerful media to infuse social, political and religious ideologies in the minds of the people. At present it is commonly used as an entertainment media. The first Talking Movie was introduced in Madras in 1931. The A.V.M. and Vijaya Vahini studios at Chennai, Pakshiraja company at Coimbatore, Modern Theatres at Salem are some of the important

centres of film industry.A.P.Nagarajan,T.Ramanna,K.Balachander, S.P.Muthuraman, Bharathiraja, Bhakyaraj, Manirathnam, Sreedhar are some of the popular film directors .

The first Talking Movie in Tamil was Kalidass.

Hence, the development of Modern Tamil literature and fine arts in Tamilnadu reflect the social and political ideologies of the people. The traditional views and values are challenged through revolutionary ideas which enable the society towards a transition in the modern period.

Learning Outcome:

1) **Acquired knowledge about the development of literature and culture in Tamilnadu.**
2) **Identified the contemporary literary works of Tamilnadu.**
3) **Understood the various forms of Arts that exist in Tamilnadu.**

SELF EVALUATION

I . Choose the correct answer

1) The 'Grandfather' of Tamil was
   a)Kathiresan Chettiar (b) Venkatasamy Nattar c) U.V.Swaminathan Iyer (d) Maraimalai Adigal.
2) The Tamil dictionary called "Agara Mudali was written by
   a)Avvai Duraisamy Pillai (b) Devaneyaka Pavanar c) Namasivaya Mudaliyar (d) Dr.M.Varadarasanar
3) Sandilyan wrote the historic novel
   a)Kadalpura (b) Vellaikari, (c) Chandragantha (d) Kudumba Villaku.
4) The father of 'Tamil Drama was
   a)Pammal Sambandam Mudaliar (b) Mononmaniyam Sundaram Pillai (c) T.K.S.Brothers (d) Surya Narayana Sastri.
5) The first Talking Movie was introduced at Madras in
   a)1937 (b) 1931 (c) 1934 (d) 1947

II . Fill in the blanks

1) C.Rajaji wrote ……..

2) ……. was written by Desigavinayakam Pillai.

3) Padma Subramaniam is one of the famous artists in the field of…….……

4) M.S.Subbulakshmi is one of the famous singers in.…… music.

III . Match the following

1) Kunnakkudi Vaithiyanathan	Dancer
2) Karukurichi Arunachalam	Violin
3) T.M.Soundararajan	Folk Music
4) Pushpavanam Kuppuswamy	Nathaswaram
5) Vaijayanthi Mala	Singer

IV Answer the following briefly

1) Write a short note on the development of Tamil prose

2) Mention some names of Tamil novel writers

3) Give some names of the dancers in Tamilnadu.

4) Mention two music colleges in Tamilnadu

V. Answer in detail

1) Explain the progress of Tamil novel

2) Explain the development of poetry in Tamilnadu

3) Write in detail about the progress in Tamil cinema

PRACTICAL ACTIVITIES

1) Collect the pictures of artists in different fields.

CIVICS

1. OUR NATIONAL GOALS

Learning Objectyives

1) **Acquires knowledge about our national goals.**
2) **Understands how our national goals can be realised.**
3) **Learns to explain the national goals.**

India attained freedom on 15th August 1947. Our National leaders set up the Constituent Assembly to draw a Constitution for India. Our constitution came into force on 26th January 1950, we celebrate this day as the Republic day. Our National leaders visualised free India to enjoy the concept of equality. After attaining independence our country faced many social and economic problems like poverty, population growth, illiteracy and unemployment. There was a need to ensure liberty, equality and justice for every citizen, this could be achieved only by obtaining our national goals. If the goals are clear the fulfillment will become easier. These national goals give us directions to achieve our national development. Our national goals are mentioned in the Preamble of our Constitution.

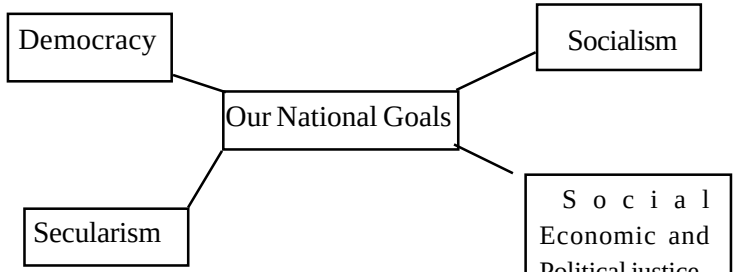


Fig.No: 1.1 Our National Goals

DEMOCRACY

Democracy is one of the most important political doctrines of the world. The word democracy is derived from a Greek word 'Demos' means people and Cracy means 'Government'. Ours is a democratic form of Government. According to Abraham Lincoln the former President of America 'Democracy is a government of the people, for the people and by the people'. In a Democracy voice of the people is given utmost importance.

Discuss with your teacher the various Democratic governments in the world.

Democracy at Work: In a democratic country people have political and legal rights. For example the right to vote, right to express political opinion and the right to be elected. In a system of democracy the Universal Adult Franchise is followed. In 1985 our former Prime Minister Mr.RajivGandhi reduced voting age from 21 to 18. Any person can be elected to the highest office in the state. In a sovereign democratic country the people are the king makers. Our Democracy works for the welfare of the people.

Types of Democracy: There are two types of democracy namely (1) Direct democracy and (2) Indirect democracy. In a Direct democracy the people frame the laws and amend them wherever necessary. This is suitable to the countries with less population example Switzerland. In an Indirect democracy the representatives are duly elected by the people and act on behalf of the people. Indirect.democracy is suitable to big countries like India. In this type we have a three tier system namely (1) Central Government (2) State Government and (3) Local Bodies. Elections are conducted to elect the members for these three systems.

Aims of Our Democracy: Our democracy works for the welfare of the people. Equal opportunity is given to all in matters of social, economic and political life. India is the largest democratic country in the world.

Election Commission of India: A Central Election Commission has been established to safeguard our democratic traditions. It's head quarters is situated in Delhi. The function of the Election Commission is to conduct elections in a free and fair manner. It consists of a Chief Election Commissioner and two others as Election Commissioners. They are appointed by the President of India. Every state in India, has an election commsiion of its own. The Tamilnadu State Election Commission is situated at Chennai.

The Election Commission conduct elections to select the peoples' representatives to the Parliament and State Legislatures. Elections are also conducted for local bodies. Apart from the general elections, whenever a situation arises, mid-term polls or by-elections are also conducted by the Election Commission.

So far, fourteen general elections were conducted for parliament after the independence of India. In the fourteenth general election, for the first time, elctronic system of voting was implemeted throughout India (Fig.No.1.2). Earlier electronic system of voting was adapted only in few places.

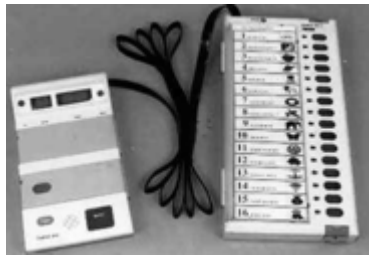


Fig.No.1.2
Electronic Voting Machine

Party System: For a successful function of a democratic Government the party system should work well. There are three kinds of party systems. They are (1) Single party system (2) Biparty system and (3) Multi party system. India is an example for the Multi Party system. In India political parties are divided into National parties and Regional parties. Candidates from different parties contest for elections to the Parliament and State Legislative Assemblies.

Formation of the Democratic Government: People cast their vote to the candidate belonging to any party. The party that secures majority of seats in the parliamentary election will form the Central Government. Likewise, the party that secures majority of seats in the

Model Polling Station

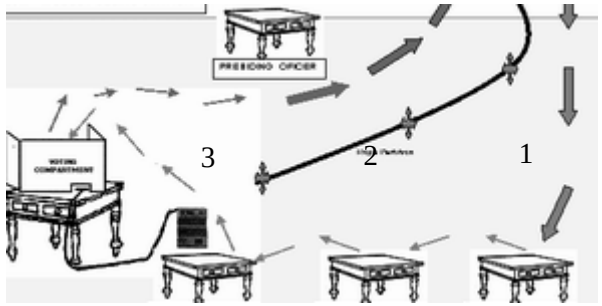


Fig.No. 1.3 Polling Agents

Assembly election will form the State Government .In both the elections, the second majority party will be given the status of an opposition. A strong opposition is very important for the successful functioning of the democracy in a country. The opposition party can expose the defects and mistakes committed by the ruling party. The parliament at the national level and legislature at State level formulate

Fig. No. 1.4 Parliament Building - Delhi

Essential factors for a successful Democracy: For a successful democracy, the citizen should be educated and know their duties and rights. They should know how the Government policies affect them, in order to elect the right representatives to the government. They can fulfill the goals of our government.

II. S O C I A L I S M

Socialism means equal distribution of a nation's resources among the people without any discrimination. The Indian National Congress held at Avadi in 1955, under the guidance of K.Kamaraj, the then Chief Minister of Tamilnadu passed a resolution, "to follow the principle of socialism" in India.

Need For Socialism in India: During the British rule, the agriculture and industries were neglected. Agriculture is considered the back bone of the Indian economy. 80% of the population live in villages, most of them are Agriculturists. Our society is divided into rich and poor. While the rich people are able to fulfil all their needs, poor people find it very difficult to get even their basic needs. The line that divides these two is called the poverty line. At present 1/3 of our population lives below the poverty line. We have to fill up the gap between the rich and the poor. This can be achieved only through a Socialist Government.

Welfare schemes in India:

1. In India, the government is trying to bring economic equality by introducing various schemes like, (a) Public Distribution system of food supply (b) Low cost housing scheme (c) Providing employment and education for every citizen of India.
2. The Land Ceiling Act of India and Boodhan movement of Acharaya Vinoba Bhave aim at providing land to the landless.
3. Social Welfare Commission has been established for the upliftment of socially and economically backward people.
4. Fundamental Rights: (a) Right to Equality (b) Right to Freedom (c) Right against Exploitation (d) Right to freedom of Religions (e) Cultural and Education rights (f) Right to Constitutional Remedies are sanctioned to all Indians irrespective of caste, creed, sex and place of birth.

Fundamental Rights are given in Part III of Indian Constitution.

5. **Directive Principles of State Policy:** It lays down certain guidelines for our Government to achieve our National goals. These guidelines aim at establishing a welfare state. The guidelines are (a) High standard of living to the people (b)Ways and means to improve a comfortable living (c) Serving the interests of the poor (d) Preventing t he accumulation of wealth in a single individual or place (e) Ensuring the proper use of the country's wealth for the benefit of all.

Directive Principles are given in Part IV of Indian Constitution.

The Government must keep in mind these guidelines while formulating policies and making laws in the day-to-day administration.

6. The government of India has also introduced many schemes to bring down the inequalities among the people. They are (1) Ten Five year plans (2) 20 point programme (3) Jawahar yojna plan, (4) self employment schemes, (5) Indra Mahila Yojna for women's welfare. 6)Annapoorna scheme for the welfare of senior citizens (7) Sarva Siksha Abiyan.

These guidelines act as a measuring rod to assess the success or failure of our socialist government.

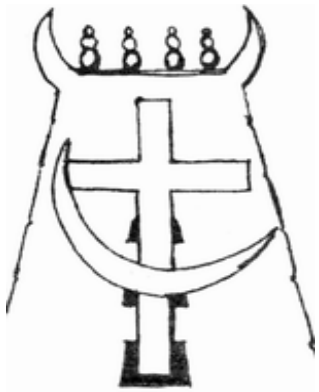
SECULARISM

The word secular is derived from the Latin word saeculum which means 'Not Religious'. The basic principle of Secularism is "treating all the religions alike and not supporting any particular religion". Sovereign Socialist, Secular Democratic Republic is the preamble of the Indian Constitution. Secularism is one of the most important of all our national goals. The word secularism, included in the preamble of the Constitution by the 42nd Amendment in 1976, is a special feature of our Constitution. During mediaval period, Mughul King Akbar, Maharaja Ranjit Singh practiced the policy of secularism. In 19th century socio-religious reformers like Raja Ram Mohan Roy and Swami Vivekananda hailed the policy of secularism.

Need for secularism: In India, different relegion exists. They are: Hinduism, Christianity , Islam, Sikhism, Jainism , Buddhism, etc. At present, conflict exists among the religious groups. In order to maintain religious harmony, there is a need for practising the principle of secularism.

Secularism in India: In India secularism means that every Indian whether he/she is a Hindu, Muslim or Christian or the follower of any other religion will have complete liberty and freedom to practice his or her religion. In India there is no state religion. The people in India have the right to choose, practice and preach their religion. Government will not interfere in the religious practices of the people.

Fig.1.5 Secularism



In our country religion is kept away from Government and its policies. Everyone has the right to worship anywhere in anyway. However there is a condition imposed on them that none of their acts or speech should hurt the feelings of people of the other religion. In our country people are taught to respect other religions. Religious tolerance is an important aspect of our ancient Indian culture. Any person whatever his/her religion can hold any high post in any office of Government.

Persons belong to different religion are holding highest posts, such as President of India. Every religion is given protection to preach their religion freely for the growth of their religions. The only condition is that the given protection should not be misused which may lead to communal conflicts. So, the government is trying to educate the people to infuse the spirit of Secularism. It is the duty of every citizen of India to cooperate with the government for the promotion of religious

harmony and tolerance. Politicians, teachers and religious heads play an important role in promoting religious tolerence among the people. "Right to freedom of religion" is one of our fundamental rights guaranteed by our Constitution.

SOCIAL, ECONOMIC AND POLITICAL JUSTICE

Aim of our constitution is to secure all its citizens, the Social, Economic and Political justice; Equality of status and opportunity to all. This was ensured with Liberty of thought, expression beliefs faith and worship. This reveals that social justice is sanctioned to all. A simple common citizenship is assured to all irrespective of religion, caste, creed and sex. The services rendered by the state are distributed equally among all its citizens. Religious freedom, abolition of Untouchability, establishment of various Social Welfare Commissions are some of the schemes introduced by the Government to remove inequality in various social groups. Gandhiji, Periyar and Sri.Narayana Guru championed the cause of abolition of untouchability.

Government has passed various acts to improve the status of women and to abolish child labour in India. Right to form Unions and associations, Right to constitutional remedies, Right against exploitation, cultural and Educational right, Abolition of Bonded labour show that social justice is guaranteed to all Indians without any difference.

Mrs Indira Gandhi, our former Prime Minister was responsible for the abolition of Bonded Labour in 1976.

All Indians can move freely and settle in any place in India. He or she can acquire or dispose of property, practice any profession or carry on any occupation trade or business. A service commission has been established for the qualified person to get employment in the various government departments on merit basis. Uinon Public Service Commission (UPSC), Tamilnadu Public Service Commisssion (TNPSC) and Railway Recruitment Board (RRB) are some of the

service commissions to select the candidates for the various government jobs in Central as well as in State Government.

As ours is a Democratic country our constitution has given the right to vote to everyone. This is called Adult Franchise. According to this the right to vote and elect their leaders is given to all, irrespective of caste, creed, religion, education , sex, property, whether high or low provided they complete the age of 18. "Common laws for all" is the main aim of our social democratic nation. There is an Independent Judiciary in India to safeguard our Economic, Social and Political rights guaranteed by our Constitution.

Learning Outcome

1. **Acquired knowledge about our National goals, democracy, Socialisim, Secularism, Social, Economical and Political justice.**
2. **Understood how our National goals can be realised.**
3. **Will be able to explain the national goals.**

SELF EVALUATION

I Choose the Correct Answer:

1. A suitable definition of Democracy was given by:
   (a)Washington (b) Abraham Lincoln (c) Kennedy
   (d) Woodrow Wilson.
2. The age of Voting right was reduced from 21 to 18 years by
   (a) Indira Gandhi (b) Morarji Desai (c) .Rajiv Gandhi (d) V.P.Singh.
3. Total number of General Elections held for parliament so far
   (a) 12 (b) 13 (c) 14 (d) 15
4. Multiparty system is in vogue at
   (a) England (b) USA (c) India (d) Australia

II Fill in the Blanks:

1. Our Constitution came into force in the year, ----------
2. 'Demos' means ----------
3. The Resolution of ---------- ---------- was passed in the National Congress session held at Avadi, in the year1955.

4. The Directive Principles are given in ---------- of our consitution.
5. Secularism included in the Preamble of the constitution by the ---------- Amendment in 1976.

III. Match the Following:

1.	Gandhiji	Right to equality
2.	Indira Gandhi	Acharya Vinobabhave
3.	fundamental rights	Abolition of bonded labour
4.	Bhoodhan movement	reduction of voting age to 18
5.	1985	abolision of untouchability

IV. Answer the following briefly:

1. What are the National goals of India?.
2. Define the term Democracy.
3. What is meant by Adult Franchise?
4. What are the Fundamental Rights guaranteed in our Constitution.?
5. What are the aims of our Democracy?
6. What are the three types of Party system?
7. What is the meaning of Secularism?
8. Name the reformers who fought for the abolition of Untouchability.
9. Define Socialism.

V. Answer in detail:

1. India is a Democratic Country - Explain
2. Describe the policy of Securalism in India.
3. Write about the Socialism in India.
4. Write about the Social , economical and political justice given to Indian citizen.

PRACTICAL ACTIVITIES

1. With the help of your teacher, conduct the election of the class leader in a democratic way.
2. Arrange for a mock parliament

2. NATIONAL INTEGRATION

Learning Objectives

1. **Learn about our Heritage**
2. **Know the meaning of National Integration.**
3. **Learn about Unity in Diversity.**

India is one of the largest Democratic countries in the world. Her culture is termed as the best in the history of the world. India is a land of variety and diversity. India has diversed geographical and cultural features.

Diversity in Geographical Features:

Diversities are seen in land scapes, climate natural vegetation and soil. There are high mountains, plateaus and low lands in India. Different climates prevail in India. We see thorny bushes in Rajasthan and dense forests in Assam.

Diversity in Cultural Factors:

Diversities are seen in languages, races, religion and caste. Indians speak numerous languages. While Hindi, Marathi, Gujarathi, Punjabi, Urudu and Bengali are the major languages spoken in North India, Tamil, Malayalam, Telugu, Oriya and Kannada are the major languages spoken in South India. Many famous literatures were written in various languages. Sanskrit works like Valmiki's Ramayana, Kalidasa's Sakunthala and Tamil works like Kamba Ramayana, Thiruvalluvar's Thirukkural are appreciated and enjoyed by all the Indians irrespective of caste, religion and language. Hundreds of minor languages and tribal languages are also spoken in India. Tribal languages have no

scripts. People of India have the right to preserve their culture and language.

18 Languages are recognised by our Constitution

Different festivals like Deepavali, Ramzan, Christmas, Gurunanak Jayanthi, Buddha Poornima, Mahavir Jayanthi are celebrated in India by the people of different religions. Inspite of the differences the Indians practice religious tolerance.

Because of the differences in climate, cutivation of crops also differ. Based on the crops cultivated, the food habits differ from one place to another. So, rice is the staple food in many southern states whereas wheat becomes the staple food in the northern states of India.

Unity in Diversity and National Integration: National Integration means a feeling of oneness and Unity among the people of a country where all citizen irrespective of any culture live together peacefully. The National Integration paved the way for the people to work together for the development of the country. It also provides strength to fight against the evil forces like communalism and terrorism.

National Integration in India. Inspite of the Geographical and cultural differences, the wonderful element of unity binds all the people together. This unity is the special feature of our culture, we call this as"Unity in Diversity" The feeling of this Unity in Diversity is named as National Integration in India. Irrespective of differences in caste, religion and language we all take pride in calling ourselves as Indians and then as Tamilians, Keralites,Christians and Muslims. The feeling we have within us as Indians, help us to forget the difference and live in Unity.

The Secular character of our Government permits the people to celebrate the different religious festivals peacefully.

India is compared to a garland of flowers held together by means of a thread called Unity

Factors Promoting National Integration:

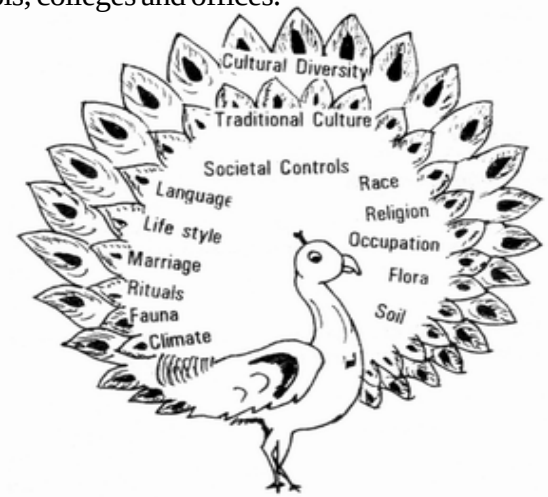
1) **Our Customs, Habits and Heritage:** India's heirtage advocates hospitality, charity, friendship, love, unselfishness, peace, mercy and tolerance. It helps the Indians live in Unity forgetting all the differences.

2) **Constitutional Rights:** Our Constitution lays the foundation for National Integration. Our Constitution grants equality, Freedom and Justice to all the citizen of India. Fundamental Rights are guaranteed to the people irrespective of caste, creed, sex, religion and race. Privileges are given to the weaker sections like scheduled caste and tribes.

Gandhiji fought for the abolition of untouchability

The values of Socialism and Secularism have greatly helped the cause of National Integration. Every Indian should work together to promote the above concepts.

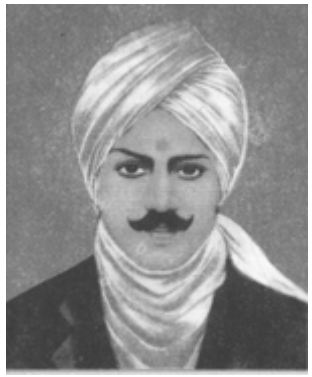
3) National Festivals: National Festivals like Independence Day, Republic Day, National Integration Day and Gandhi Jayanthi are celebrated by the people of our country. We celebrate these festivals in our schools, colleges and offices.



4) National Flag and National Anthem: All Indians give respect to our National Flag which represents our courage ,sacrifice, truth, peace and prosperity. We are inspired by the National Anthem in which we sing about the greatness of India. Our National song Vande Matharam induces the spirit of patriotism.

5) Regional Inter-dependence: We have different geographical features and climate in different states. The crop we grow differ from State to State. So there is an exchange of goods and crops from one state to another. We get ivory from Kerala, betal leaf from Tamilnadu and wheat from Punjab. Our National poet Subramaniya Bharathiar wrote may songs on National Integration in Tamil language.

6) Feeling of oneness: The feeling that we are all Indians, that we are the sons of Bharath and that all Indians are my brothers and sisters help us to promote National Integration. United we live, divided we fall, is the spirit that safeguards the National Integration. .



Learn from your teacher the famous songs of Subramaniya Bharathi on National Integration.

Factors Disrupting National Integration: Though we take pride in our National Unity, we still face various factors which blocks the growth of National Integration in India.

November 19th Indira Gandhi's birthday is celebrated as National Integration day.

a) Communalism: In our country communities are formed on the basis of religions. Communalism refers to selfish aggressive attitude of one community towards another. This feeling sometimes lead to communal riots. Thousands of innocent people die during these

Communal riots. So, the Indian citizens should develop the spirit of religious tolerance and the feeling of oneness.

b) Linguisim: In 1956 India was divided into many states on the basis of languages, these states are called Linguistic States. In general people of India have great love for their mother tongue. Sometimes they develop narrow- minded approach towards other languages and hate them. Therefore we must show our respect to other languages which helps to unite the people who speak different languages

c)Casteism: Casteism hinders our National Integration. All men are born equal before God and law. Casteism is against this principle. In India caste systems originated in a simple form during the vedic period. Caste system is based on the principles of varna which divided the society into four groups. Brahmins, Kshathryas, Vaishyas and Sudras. In due course of time the varna system gave rise to many castes and sub castes. Hence the feeling of superiority and inferiority began to develop in the minds of the people. People of higher caste hesitated to mix or to make social contacts with the people of lower castes. This hinders the smooth functioning of a democracy and the growth of National Integration.

Learning Outcome

1) **Acquired knowledge about National Integration.**
2) **Understood the importance of National Integration.**
3) **Understood the concept Unity in Diversity.**
4) **Learnt about the ways for promoting National Integration.**

SELF EVALUATION

I Choose the correct answer:

1. Ramayana was written in Tamil by
   a) St.Valmiki (b) St.Vyasa (c) Thulasidas (d) Kambar
2. Number of languages recognised by the Constitution of India
   a) 16 b) 18 c) 20 d) 22
3. The staple food of Northern states of India is
   a) Rice (b) Wheat (c) Maize (d) Barley

II. Fill in the blanks:

1. Untouchability was abolished by the effort of ----------.
2. National Integration Day is celebrated every year on ----------
3. Selfish aggressive attitude of one community towards another leads to ----------.

III. Match the following:

1) 19th November	Kalidas
2) Kannada	National Integration Day
3) Sakunthalam	South Indian Language
4) 1956	Linguistic state

IV Answer the following briefly:

1) Name the languages spoken in India .
2) Name some of the famous litterature of India
3) Name the religions originated in India
4) Write about the different religious festivals celebrated in India?
5) What is meant by National Integration?

V Answer in a detail:

1) Explain India is a land of Unity in Diversity?
2) What are the factors promoting National Integration?
3) Write a note on the factors disrupting National Integration?

PRACTICAL ACTIVITIES

1) Enact a drama to show National Integration
2) Make an Album of our National symbols
3) Try to memorise the National Integration pledge.

National Integration pledge:

I, solemnly pledge to work with dedication to preserve and strengthen the freedom and integrity of the nation.

I , further affirm that I shall never resort to violence and that all differences and disputes relating to religion, language, region or other political or economic grievances should be settled by peaceful and constitutional means.

3. NATIONAL DEFENCE SYSTEM

Learning Objectives

Pupil

1) **Learns about the Indian Defence system**
2) **Understand the three wings of our Defence system**
3) **Learns the achievements of our Defence**

From time immemorial, India is a peace loving country. India always maintained cordial relationship with all the countries in general and with its neighbours in particular. At the same time it has to strengthen its security to defend its border from any foreign aggression. Like other countries, India is also compelled to maintain and to strengthen its defence, in order to protect the people.

Historical background: In the ancient period our kings were called **'Chakaravarthi'** and they acted as the supreme commander of the Defence force. Mauryan Kings had a military leader called 'Senapathi' to assist them. In the Mediaeval Period Allaudin Khilji, and Shersha had maintained a powerful army and protected their territory. After the coming of the Europeans, the Brittishers developed the naval force in India and had a powerful navy. After independence, Government of India had developed army, navy and airforce.

The need for defence system:

National Security is very essential for the social and economic developments of any country. It is also important for the growth of a country's peace and prosperity. So it is the duty of any Government to defend the country from internal disturbances and external aggression.

India shares a common land border with Pakistan, Nepal, Bhutan, Bangla Desh, Burma and China. It also shares a common sea border with Sri Lanka.

Since independence, India had to face aggressions from its neibouring countries like China and Pakistan. After the Indo - China war in 1962, the country realised the need to strengthen its defence system. So, the Government of India has given higher priorities to the defence sector.

India allotted a sum of Rs. 770 billion for defence in the budget period 2004-2005

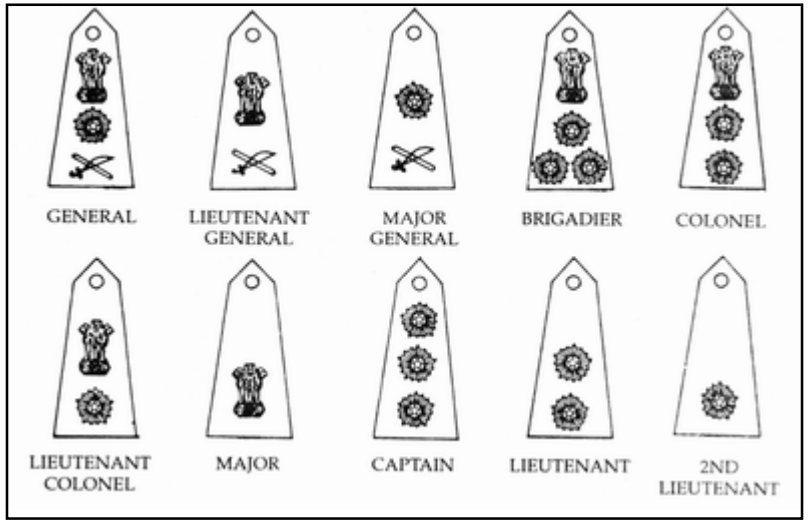
Indian Defence Services: The President of India being the head of the State occupies the highest position in our defence organisation. He is the supreme commander of the Armed forces of India. Our defence system has three wings. Defence forces are functioning under the supervision of our Defence Minister.who formulates the Defence policy of our country. The three wings of our defence system includes:

(1) Army, (2)Navy and (3) Airforce.

Army: The army headquarters is located in New Delhi. The chief of the Army holds the rank of the 'General'. The Army has branches like Infantry, Military Tanks , and Artillary or gun Battalion. Engineering section maintains the above three branches. The entire army is divided into 5 commands. They are:

Commands	Head Quarters
1. Eastern	Kolkatta
2. Northern	Uthambur
3. Central	Lucknow
4. Western	Simla
5. Southern	Pune

Functions of the Army: The main work of our army is to defend our border and to fight in the battle field. In times of peace, army helps to maintain law and order in disturbed areas. They render assistance during natural calamities like floods,earthquakes,fire etc. **January 15th** of every year in observed **as Army day**.

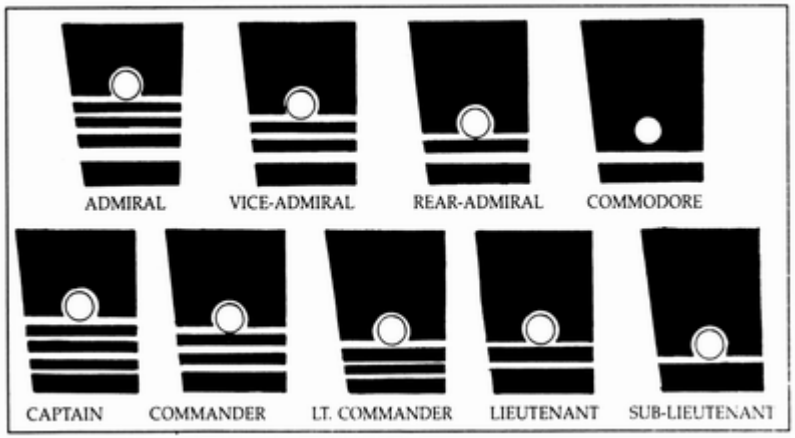


Navy: The chief function of Navy is to protect the Indian coastal areas and the offshore areas. Headquarters of Navy is located in New Delhi. The chief of the naval staff is the Admiral. There are three naval commands:

Command	Headquarters
1) Western	Bombay
2) Eastern	Visakapattinam
3) Southern	Cochin

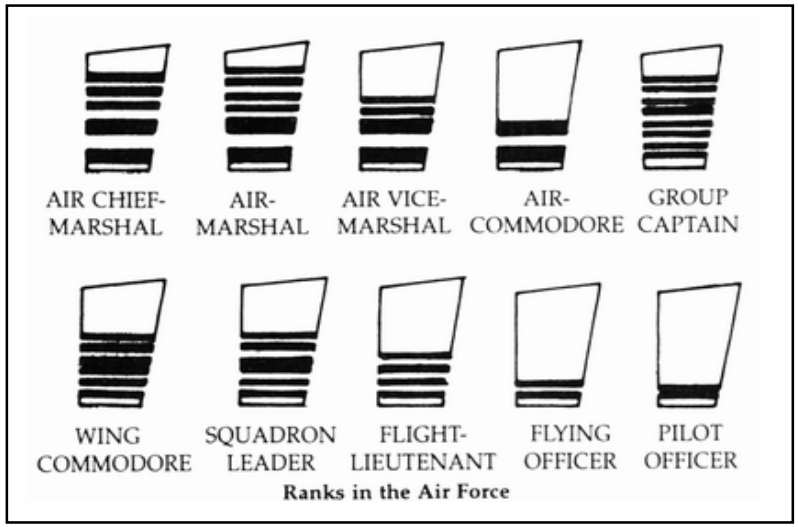
Naval training is given at different centres like Bombay , Cochin and Visakapattinam. Warships are built in the ship yards at Kolkatta. The famous I N S Godhavari, a naval ship was designed by our engineers.

Garder Reech, the ship builders at Kolkatta, Goa shipyard and Cochin shipyard construct our warships and submarines. Our navy is not only large but also strong. It has the most modern warships and advanced submarines like I N S Chakra, INS Nilgiri and I N S Himagiri., **December 4th** of every year is observed as **Navy day.**



Air Force: We have a strong and modern airforce. The airforce has its headquarters in New Delhi. Highest Air officer in the airforce is Air Chief Marshall. The Indian airforce is organised into 5 operational commands and two supporting commands. They are:

Commands	**Head quarters**
1) Central	Allahabad
2) Eastern	Shillong
3) Southern	Trivandrum
4) South Western	Jodhpur
5) Western	Delhi
Supporting commands	
1) Maintenance command	Nagpur
2) Training command	Bangalore



Ranks in the Air Force

Our Airforce has many types of fighters like the Hunter, Ajeet MIG 21 MIG 27 and Mirage 2000 "Agni" missile was launched in May 22 1989. October 8th of every year is observed as Air force day.

His Excellency Dr.A.P.J.Abdul Kalam, the President of India is the father of Agni Missile.

Defence Training Centres: Defence training centre called National Defence Academy (NDA) is located at Pune. Advanced Training is given to Armed force officers at Willington. Other training centres are Indian Military Academy (IMA) at Dehradun and College of Military Engineering at Kirkee. The training centre of the Navy is at Cochin and Visakapattinam. Air Force Academy is situated at Hyderabad.

Centres of defence production: Hindustan Aeronautics Limited at Bangalore manufactures the jet fighter Aircrafts like the MIG 21, Gnats and Maruts. Mazagaon Dock Ltd manufacture warships and submarines. Tanks, guns and military explosives are some of the defence products manufactured in India. Vijayantha and Arjun tanks are manufactured at Avadi. Military explosives are manufactured at Aravangadu in Nilgiris.

Second line of Defence: The second line of Defence system are helping our Country. They are (1) Territorial Army (2) Border Security Force (3) National Cadet Corps (4) the Coast Guard (5) Home Guards.

Territorial Army: Territorial army was established in 1949. It is a voluntary partime citizen's force. Military training is given to the youths. It provides an opportunity to citizens to take part in country's defence.

Border Security Force (BSF): Border Security Force was formed in 1965, for guarding the National frontiers. It helps the army in maintaining internal security. It also prevents illegal trade and smuggling.

National Cadet Corps (NCC): National Cadet Corps prepares the young boys and girls studying in schools and colleges for the defence of the country. It is a voluntary organisation. It develops the spirit of adventure, feeling of patriotism and social service among the students.

The Coast Guard: The head quarters of coast guard is at New Delhi. It is headed by a Director General. It has three regional head quarters at Mumbai, Chennai and Port Blair. Its main duties are to protect fisheries and checking smuggling.

Home Guards: It was established in 1978 to maintain law and order in the state. They render services during the time of floods and earthquakes. It is only a honorary Service.

Achievements of our Defence Forces:

(1) During the Indo- Pakistan war of 1971, India with its strong defence base defeated Pakistan and won a big victory. The out come of the war resulted in the formation of independant Bangladesh .

2) Our Army was invited to serve as a Peace keeping force along with UNO Peace Corps , particularly in Korea, Vietnam and Congo.

3) Our defence force was invited by the government of Maldives to suppress the military coup and peace was restored .

Every year December 7th is observed as Flag day in remembrance of the sacrifices of the Soliders of our country.

To protect and guard our nation ,our armed forces are always kept ready. Our youth should come forward to serve and save the nation by joining the armed forces. Recruitment to the Defence services is open to all Indians. It is the duty of every citizen to serve the country.

Army	Navy	Air Force
General	Admiral	Air Chief Marshal
Lt.General	Vice Admiral	Air Marshal
Major General	Rear Admiral	Air Vice Marshal
Brigadier	Commodore	Air Commodore
Colonel	Captain	Group Captain
Lt.colonel	Commander	Wing Commander
Major	Lt Commander	Squadron Leader
Captain	Lieutenant	Flight Lieutenant
Lieutenant	Sub-Lieutenant	Flying Officer
Second Lieutenant	Acting sub- Lieutenant	Pilot Officer

Learning Outcome

1. **Acquired knowledge about our Defence system.**
2. **Understood the three wings of our Defence.**
3. **Will know to describe our nations Defence system.**
4. **Will know the importance of Second line of Defence.**

SELF EVALUATION

I. Choose the Correct Answer

1) Indo- China war took place in the year
a) 1962 (b) 1926 (c) 1952 (d) 1942

2) The Supreme Commander of the Armed forces is our
a)Prime Minister (b) President (c) Governor (d) Chief Minister

3) The chief of the Naval staff is called
a)Commander (b) Major (c) Admiral (d) Air chief Marshall.
4) India was declared as a Democratic Republic in the year
a)1947 (b) 1950 (c) 1940 (d) 1951

II. Fill in the Blanks

1) The Indian Army chief is----------.
2) The Head quarters of Western Indian Army is at -------.
3) The Hindustan Aeronautics Limited is located at --------.
4) The Head quarters of the coast guard is at ----------.

III Match the following

1)	Eastern Navy Command	Chinese Aggression
2)	1962	Admiral
3)	INS Chakra	Visakapatnam
4)	Agni	Sub-Marine
5)	Navy	Missile

IV Answer the following briefly

1) Mention the three wings of our Defence system
2) Write a short note on our Army system
3) Mention the highest rank of the naval commander of our defence
4) Mention the Defence training centres in India
5) Name the Defence products manufacturing industries in India

V Answer in detail

1) What are the causes for the need of Defence system in India
2) Describe the structure and administration of Indian Navy
3) Describe the structure and administration of Indian Airforce
4) Describe our second line of Defence system.

PRACTICAL ACTIVITIES

1) Prepare an Album about our Defence system
2) Observe Flag day in your school
3) Make charts to show the different ranks of the Army, Navy and Airforce

4. OUR SOCIAL PROBLEMS AND SOLUTIONS

Learning Objectives

1) **Understands the problems of women and how to solve them.**
2) **Learns the problems of illiteracy and how to remove them.**
3) **Knows the issues of child labour and how to eradicate them.**

Since independence our country has faced a number of social problems. The most important among them are illiteracy, injustice to women and child labour, which require immediate attention.

ILLITERACY

Illiteracy means the inability to read and write. Illiteracy leads to ignorance, unemployment and poverty. The level of literacy rate and education among the people in a country determines the development of the nation. One of the social problems prevailing in India is illiteracy. So India is taking serious steps to reduce the illiteracy ratio rate.

The low level of literacy rate hinders the economic development of a country. Besides the society also suffers in terms of socio, economic and political problems. Similarly an illiterate person, because of his/her ignorance looses an opportunity even to know about the various welfare schemes provided by the government. Moreover, the illiteracy leads to the problem of child labour, female infanticide and growth of population. Thus, the illiteracy is a hurdle in the progress and prosperity of a nation.

Measures to eradicate illiteracy: Right to education is one of the important fundamental rights guaranteed by our Constitution.

1) University Education commission of 1948-1949 stressed the use of mother tongue as the medium of instruction so as to rise the level of literacy.
2) The Educational Policy of 1968 introduced uniform pattern of 10+2+3 education all over the country. It aimed to eradicate mass illiteracy in India.
3) National Education Policy of 1986 laid emphasis on compulsory Primary education. Non formal education was introduced to reduce the school dropouts.
4) In 1991 Professor Dave's Education Commission introduced a method of education known as M.L.L (Minimum level of learning) to improve Primary education.
5) National Educational policy of 1992 introduced the programme like 'Black Board Operation' to provide basic facilities in schools.
6) National Literacy Mission gave importance to Adult Education.
7) Sarva Shiksha Abhiyan (SSA- 2003): Sarva Shiksha Abhiyan is an effort to universalize elementary education by community-ownership of the school system. It is a response to the demand for quality based education all over the country. The SSA programme is an attempt to provide an opportunity for improving humun capabilities to all children, through provision of community-owned quality education in a mission mode.

Total literacy rate of India is 65.38%. Male-75.85%, Female-54.16% as per 2001 census.

Measures in Tamilnadu: Based on the above policies adopted by the Government of India, the Tamilnadu government has framed the following measures to eradicate illiteracy.

1. Admittinng all the children in the schools at the school going age.
2. All children complete five years of primary schooling by 2007.

UNO declared 1990 as the International literacy year and every year September 8th is celebrated as World Literacy Day

3. All children complete eight years of elementary schooling by 2010.
4. Universal retention by 2010.
5. Bridging all gender and social gap of primary stage by 2007
6. Establishing a school in an area where the population is 300 and above.

As per 2001 census Literacy percentage in Tamil Nadu is 73.5% . Male 82.4% and Female 64.4%.

Injustice to Women:

According to the Census of 1991, there were 846.3 million people in India; of these, 439.2 million are males and 407.1 million are females. Though women population constitutes half of the total population, women are not treated equally on par with men by our society. If we look back our history, during ancient period, women enjoyed a place of respect and honour in the society. Over a period of time the position of women started deteriorating slowly and gradually in our society.

Social evils on women:

1. Male Chauvanism: Since, our society is a patriarchial society, men dominated the society. Women were confined to the Kitchen. Economically they are dependent on men.
2. Practice of Sati: It means that after her husband's death wife was burnt alive in the funeral pyre of her husband.
3. Widow hood: As child marriage was in practice many women lost their husband and became widows even at young ages. They were not allowed to remarry. Further they were humiliated by the society..
4. Female Infanticide: Female babies were considered as a curse and source of misery which led to female infanticide.

5. Dowry System: During the ancient period women were given 'sreedhana' voluntarily by the parents during their wedding. But in due course of time the custom has turned into a crucial social problem as a system of dowry in India.
6. Denial of Education: Women were not given proper education as they were considered as inferiors in the society.

Directive Principles of state policy gave guidlines to centre and the state to give free and compalsary education upto the age of 14.

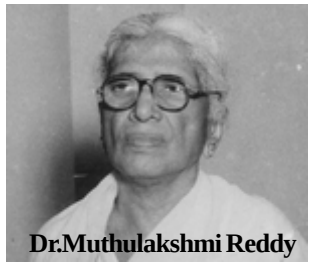
Social Reformers:

The social Reformers like Raja Ram Mohan Roy, Iswara Chandra Vidya Sagar, Dayananda Saraswathi, K.C.Sen, M.G.Ranade, Pandit Rama Bai, Jothi Pule, Dr.Muthulakshmi Reddy , Subramaniya Bharathi,EVR Periyar and Veerasa Lingam Panthulu played an important role to improve the status of women. Sir Syed Ahamad Khan worked for educating the Muslim Women.

United Nation declared the year 1978, as the "International year of women".

Measures taken to improve the status of women:

1. Practice of Sati was abolished by the act of 1829.
2. A law on widow remarriage was enacted in 1856.
3. Child marriage was banned by passing Sarada Act in 1929 due to the efforts of Dr.Muthulakshmi.
4. Women's Education was given importance.



Dr.Muthulakshmi Reddy

Dr.Muthulakshmi was the First Women Doctor in Tamilnadu

5. Daughter was given equal right to share the property of the parents by 1956 Act..
6. Equal wages for equal work have been provided for women in 1976.

7. Dowry Prohibition Act of 1961 made demand of dowry an offence punishable.
8. Government has introduced many self employment schemes to women. STEP (Support of Training and Employment Scheme) is a Government scheme enabling women to earn.
9. The Government of Tamilnadu has introduced cradle baby scheme in 1992. It protected the female child from female infanticide.

Tamilnadu Government has introduced all Women Police Stations all over the state, to safeguard the rights of women.

With the introduction of above methods the position of women improved drastically and they proved their efficiency in all the fields such as medicine, engineering, armed forces space exploration etc.

Kalpana Chawla was the first Indian born American woman who travelled to International space lab in the space shuttle Colombia along with five other astronauts.


Kalpana Chawla

Child Labour

No country can prosper unless it brings attention to the development of a child. Hence it is the responsibility of our Government to provide children with all the facilities like good health and education.

According to ILO "Child Labour means" a child below 14 years leads an adult life working long hours for low wages endangering their Physical and Mental health.

Causes for the Child Labour in India: In India child labour is a social problem. Because majority of the children in our country do not get proper food, clothing, shelter, and education. At an early age they take up petty jobs in shops, hotels and factories. Child labour is the result of the poverty.malnutrition and illiteracy.

Measures to eradicate the problem of child labour:

1 Constitutional Remedies :

i) Article 23 of our constitution prohibits forced labour including child labour.
ii) Article 45 calls upon the state to enforce universal free and compulsory education to all children in the country upto the age of 14.
iii) Article 39(F) explains that all children must be protected against all types of exploitation.

2 Legislations:

1) The Employment of Children Act of 1949 raised the minimum age for employment to 14 years and later on it was raised to 15 and 17.
2) The Plantation Labour Act of 1951 prohibits the employment of children under 12 years in plantation.
3) National policy for children was adopted in 1974 to provide facilities for the physical, mental and social development of the child.
4) The child labour Act of 1986 (Prohibition and Regulation) bans the employment of a child who has not completed the 14 years of age in factories and mines.
5) A National child labour policy was formulated in the year 1987 to eradicate child labour.

Steps taken by the Government of Tamilnadu:

The Government of Tamilnadu is seriously implementing the Child Labour Act of 1986.

1) The Tamilnadu catering establishment act of 1958 prohibits employment of children who have not completed the 16 years of age.
2) The person who violates the Child Labour Act of 1986 was punished. The ILO'S integrated programme for the elimination of child labour is enforced vigourously in Sivakasi and Tiruppur.

3) The National Child Labour Project is implemented by the Government of Tamilnadu for imparting non-formal education to the children withdrawn from the labour force.
4) Tamilnadu Slum Clearance Board has undertaken child labour eradication project in Chennai city. Tamilnadu aims at eradicating child labour by the year 2005.
5) In Tamilnadu a state level advisory board for child labour had been constituted under the Chairmanship of the Labour Minister.

The main objectives of National Child labour policy of 1987

1. Enforcement of the child labour act of 1986
2. Coverage of families of child labour under the income generating programmes.
3. Formal and non formal education for child labour in hazardous employments.
4. Setting up of special schools for child workers with the provision of vocational training.

5. Creating awarness among the different groups in the society through government and Non-governmental organizations to raise their conciousness on the issue of child labour.

Despite of all these measures the evil practice of child labour has not yet been removed.

According to the survey conducted by Sarva Sikshya Abhiyan in March 2003, there were 70,344 child labourers out of 2.12 lakhs of school children in Tamilnadu.

Learning outcome

1) **Understood the steps taken by our government to eradicate illiteracy in India.**
2 **Understood the steps taken to improve the status of women in India.**
3 **Understood the steps taken to eradicate child labour.**

SELF EVALUATION

I Choose the correct answer:

1) The first women doctor in Tamilnadu was
   a) Pandit Ramabai (b) Dr.Annie Besant (c) Dr.Muthulakshmi
   d) Dr.Sarojini Naidu
2) Kalpana Chawula was associatd with
   a) Economics (b) Astronaut (c) Science (d) Atomic Research
3) The article that prohibits child labour is
   a) Article 23 (b) Article 45 (c) Article 25 (d) Article 40

II Fill in the blanks:

1) UNO declared …… as the International Year of Women.
2) Hindu Marriage Act was passed in the year …….
3) Cradle baby scheme was introduced in the year ……
4) …….. is the Educational Scheme introduced to attain total litteracy.
5) Child Labour Act was passed in the year ……..

III Match the following:

1)1979	Education scheme
2)SSA	Sarada Act
3)1978	Evil practice
4) Sati	International year of the Child
5) Dr.Muthlakshmi	International year for women

IV Answer the following briefly:

1) Write a short note on the National Educational Policy of 1965?
2) What is M L L ?
3) What is meant by 'Black Board Operation'?
4) What is illiteracy?
5) What is Child Labour?
6) Mention the leaders who fought for the emancipation of women?

V Answer in Detail

1) Write about the injustices done to women?
2) Write about the measures to eradicate illiteracy?
3) Write about the measures taken in Tamilnadu to eradicate illteracy?
4) What are the steps taken in Tamilnadu to eliminate child labour?
5) What are the measures taken by our government to improve the status of women in India?

PRACTICAL ACTIVITIES

1) Arrange a discussion on the Economic and Social status of women in present day
2) Prepare a chart showing the educational development in India since independence.

5. OUR ECONOMIC PROBLEMS

Learning Objectives

1) **Learns the major Economic problem of India like poverty,unemployment, price rise and population explosion**
2) **Learns the causes for these Economic problems.**
3) **Learns the steps taken to solve these problems.**

We were under foreign domination till we attained Independence on 15th August 1947. The British rule in India caused backwardness in the field of Education, Industry and Agriculture. The result is that even after 57 years of independence India faces lot of economic problems. Some of the economic problems are poverty, unemployment, price rise and population explosion.

Poverty

Poverty is a social problem in which a section of the society is unable to fulfill its basic needs of life, food ,clothing and shelter. The Britishers exploited the Indians, so the Indians had a miserable life. The Indian society is divided into two categories, rich and poor. The line of demarcation between the two categories is termed as Poverty line. One third of our population live below the poverty line. Poverty affects the health of the people. It reduces the efficiency of the people. It leads to low production and weaken the economic growth. The slow economic growth cannot fulfill the basic needs of the poor people. It results in poverty which exists both in rural and urban areas.

Causes for Poverty:

1) Rapid increase of population.
2) Low income of the people
3) The price rise which reduces the purchasing capacity of the people.
4) Unemployment problem
5) Illiteracy

Remedial Measures to eradicate Poverty:

The steps initiated by the Government to eradicate poverty are known as Poverty Alleviation Programme. So far, ten five year plans have been implemented. The main objective of these economic plans were to increase the agricultural and industrial production. The plan aims to increase the income of the individual, remove poverty and to increase employment opportunities. These plans aim to set up a socialistic pattern of society based on equality and justice.

Bharath Ratna C.Subramaniam former Agricultural Minister Government of India headed the panel to U.N.O. to fight poverty and hunger in developing countries.

1) The First Five Year Plan was agriculture oriented to solve the food problems.
2) The Fourth Five Year Plan aimed to reduce the price level.
3) The Fifth Five Year Plan took measures for raising the purchasing capacity of the people living below the poverty line.
4) The Seventh and Eighth Five Year Plans aimed to remove poverty and to attain self sufficiency in food production.
5) Tenth Five Year Plan was introduced to double the per capita income of Indians.
6) Jawahar Employment Schemes were introduced to eradicate poverty.
7) The 20 point programme was introduced in 1975, with the aim to attack rural poverty and to uplift the down trodden by providing economic and social justice.

Unemployment

One of the most disturbing problem in India has been the rising rate of unemployment. Unemployment is a situation wherein the able bodied persons willing to work fail to find a job that earns their living. The person who is highly qualified but does not find a job of his qualification is termed as underemployed.

Causes for the high rate of unemployment:

1) The employment opportunities from agriculture and its allied activities are very limited. So the excessive burden of population on agriculture is the primary cause for unemployment.
2) Our population has been increasing at higher rates than the increase in the number of employment opportunities. Thus the rapid growth of population results in unemployment.
3) The vast development of education results in the increase of graduates. This in turn, lead to the growth in the educated unemployment or underemployment.
4) The advancement of Science and Technology encourages a greater use of machines in industry and agriculture. This has reduced the use of man power. This has accelerated the problem of unemployment.

Measures adopted by the Government to reduce Unemployment:

The Government of India has undertaken various measures to solve the problem of unemployment. The most important among them are:

1) Almost all the Five Year Plans aim for the increase of employment opportunities. The Second Five Year Plan expanded employment opportunities in India by creating 10 million new jobs. The Tenth Five Year Plan aimed for 10 million employment opportunities per year.

2) To generate employment opportunities the Government launched National Rural Employment Programme (NR E P) in 1980 which generated around 1000 million jobs.
3) The Rural Landless Employment Gurantee Programme (R L E G P) which was introduced in 1983 guaranteed employment to atleast one member of every landless family atleast for 100 days in a year.
4) Training for Rural Youth Employment Programme of 1979 provide technical skills to the rural youth to enable them for self- employment.
5) The Self Employment Programme for urban poor was introduced in 1997 to provide self employment opportunities for the poor.
6) The Jawahar Rozgar Yojna (J RY) was implemented in 1989 is an employment guaranteed programme. This provides financial assistance to rural areas through village panchayats.

Measures to solve the problem of unemployment:

1) Cottage and small scale industries should be developed by adopting labour intensive techniques.
2) Emphasis should be given to vocational and technical education.
3) The growing rate of population should be controlled by effective implementation of Family Planning Programme.
4) The scientific method should be adopted in cultivation to increase the employment potential.
5) Enterpreneurs should be encouraged for self employment by providing financial assistance.

Hence the crucial problem of unemployment can be removed from India if the above measures are given due importance and implemented.

PRICE RISE

The gap between the production and demand of the essential goods decide the price level in a country. If there is a less production and a greater demand there will be an increase in the price of all commodities.

This situation is also termed as inflation. Development of the economy is hindered due to inflation. It makes poor poorer and rich richer.

Causes for the price rise: Rapid growth of population, low productivity in agriculture increased government's expenditure are the main causes for the price rise in our country. Monsoon failures and poor harvest led to food shortage. Smuggling,Hoarding and black marketing are the other causes for the price rise.

Steps taken to check the price rise in India: 1. The objectives of our Five Year Plans are to increase the food supply and to reduce the price rise. Agriculture and industrial products have been increased due to Ten Five Year Plans. The First Five Year Plan which is agriculture oriented, increased the supply of food in India. Second Five Year Plan increased the production of industrial goods. The production of steel during 1990-91 was 13.5 million tonnes. It increased to 29.3 million tonnes in 2000-2001.

While the Third plan aimed for self sufficiency in food production, Fourth Five Year Plan stabilised the price level. (2) Public Distribution System was strengthened. It makes the people to get essential commodities at reasonable prices. (3) Green Revolution aimed at Intensive Agricultural development, improved techniques, new variety of seeds. More lands were brought under cultivation. Green Revolution increased the rice and wheat production. White Revolution is called as operation flood. It increased the production of Milk and Milk products. Blue Revolution increases the production of sea food in India. (4) Government is taking strict action against the people who indulge in smuggling, hoarding and black marketting (5) Fair price shops and cooperative stores are opened to enable the poor to get essential things at lower price.

POPULATION EXPLOSION

The greatest problem of India is the population explosion. It is one of the burning social problems. The term Population refers to the

number of people living in a definite area. India ranks second in the world population next to China. India occupies only 2.4% of the world area where it supports 16% of the world population. In 2001 the population of our country is 1,027,015,247 persons Males - 531,277,078, Females- 495,738,169. Population is necessary for a country's development. We need people to run the government, defend our country and to work in the farms and industries. But however when a country's population grow at an alarming rate then it hinders the economic growth. In India this problem reached the stage of population explosion.

Causes for Population Explosion:

1) High birth rate and low death rate are the causes for the rapid growth of population. High birth rate is due to the practice of early marriages in India.
2) Illiteracy among women are high. Ignorant women are not aware of the advantages of planned family.
3) The belief of the poor in having more children would increase the income of the family, leads to poverty.
4) Desire to have a male child increased the number of children in a family.
5) Low death rate is due to the advancement of medical science in India. Epidemic diseases are eradicated. Many life saving medicines are introduced, so the life expectency of a person in India is increased to more than 60 years in 2001. The Infant mortality rate declined due to the advancement in Medical Science.

The Population of Tamilnadu is 6,21,10,839 crores;
Males - 3,12,68,654 Female-3,08,42,185 as per 2001 census

Consequences of Population Explosion: The problem of Population Explosion hinders the economic development of our country, it leads to the problem of poverty, price rise and unemployment. Growing

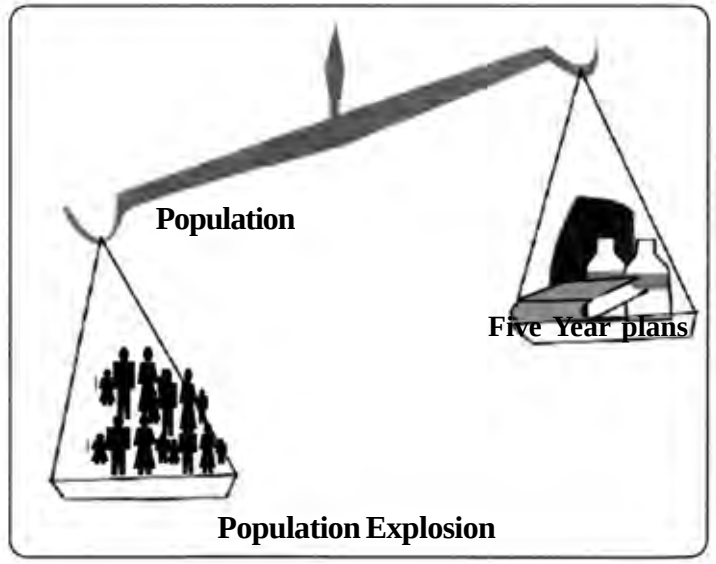
population leads to environmental pollution and unhygienic conditions. In our country 1/3 of the people are living below the poverty line. We are not in a position to attain self sufficiency in food production. Therefore, there is an urgent need to control the over population in our country.

11th July is observed as World Population Day

Remedial Measures.

In our country, the Central and State Governments have introduced many serious measures to reduce the growth of population. Besides, the following measures are given to control population explosion.

(i) The marriageable age should be raised.
(ii) The opportunities of education should be expanded so as to educate the mass about the small family norm
(iii) Effective propaganda should be made through mass media about the advantages of the family planning programme, particularly in rural areas.



Population Explosion

(iv) The population education should be included in the school curriculum in order to highlight the evil effects of population among the school going children.

(v) Above all, there should also be a change in the social out look of the people. The concept of having more children particularly male children as asset should be changed thoroughly.

Thus poverty, unemploymnet, price rise and population explosion are inter linked with one another in the economic development of a country. Among this the population explosion which occupies the top most place should be given primary concern, to achieve over all development of our country.

Learning Outcome

1) **Understood the economic problems such as poverty, unemployment, price rise and population explosion.**
2) **Understood about Green, Blue and White Revolution.**
3) **Will be able to explain the causes for India's backwardness and the steps to overcome them.**

SELF EVALUATION

I. Choose the correct answer:

1) Poverty is a
   a) Social Problem (b)Economic Problem
   (c) Industrial Problem (d) Financial Problem
2) Latest census was taken in the year
   a) 2001 (b) 1901 (c) 2002 (d) 2003

II. Fill in the blanks:

1) The 20 point programme was introduced in the year …….
2) First Five Year Plan concentrated on …….
3) In 1989 ……. was implemented as employment guaranteed, programme in rural areas.
4) India ranks …….. in the world population.

III.Match the following:

1)	NREP	World population day
2)	Inflation	Green Revolution
3)	11th July	1980
4)	Third Five Year Plan	Price Rise

IV. Answer the following briefly

1) What are the causes for poverty?
2) What is poverty line?
3) What is Green Revolution?
4) Define unemployment
5) What is population explosion?
6) Mention any two steps taken by the Government to check the price rise in India.

V. Answer in detail

1) What are the measures adopted to eradicate poverty?
2) What are the causes for the problem of unemployment in India?
3) Write a note on the causes for the Population Explosion in India?
4) What are the remedial measures to control population

Practical Activities

1) With the help of your teacher arrange for a debate on Population Explosion
2) Enact a drama on the evil effects of population explosion.

6. HUMAN RIGHTS - WOMEN RIGHTS

Learning Objectives

1) **Understands the meaning and importance of Human Rights.**
2) **Understands the Rights of Women.**
3) **Learns the role of U N O in protecting human rights.**

According to Bosanquet, " A Right is a claim recognised by a Society and enforced by the State". Earnest Barker says that "Rights are guaranteed by the state". Development of a country depends on the Rights enjoyed by every individual. Human Rights are some inherant rights which are very essential for the all round development of every individual. Some of the basic rights are Right to work, Right to move freely , Right to speak and the Right to Live. These basic rights are called as Natural Rights, later it became legal rights of men.

Historical background: The famous documents of rights the Magna Carta of 1215 AD of England, The American Bill of Rights of 1791, the French Declaration of the Rights of man of 1792 ,the Russian Revolution and our Freedom struggle resulted in establishing Constitutional guarantee for Human Rights. Social and Economic Rights developed later. In the 20th century these Human Rights were denied to the people due to colonialism, the First world war, autocratic rule of Hitler and Mussolini, the Second world war, the system of Slavery and the policy of Apartheid. Later in some of the places the Human Rights were violated, hence it became the responsibility of U.N.O to protect the Human Rights.

24th October is celebrated as UN Day every year

United Nation's Declaration on Human Rights: The United Nations Organisation came into existence on 24th October 1945, One of the main objective of UN is to protect and respect the Human Rights and Basic Freedom.

A commission was established to frame the Human Rights. The commission drafted the International Bill on Human Rights. UN adopted the Universal Declaration of Human Rights on 10th December 1948.

10th December is observed as Human Rights day

It emphasised the equality of all human beings without any discrimination. There are 30 articles in this Human Rights Document. Some of the important provisions are (1) All Human beings are born free and equal in dignity and rights (2) Every one has the right to life, liberty and Security of person (3) No one shall be held in slavery (4) All are equal before the law, and entitled to equal protection of the law ,(5) No one shall be subjected to arbitrary arrest, detention or exile. (6) Everyone has the right to freedom of movement and residence within the borders of each State (7) Every one has the right to nationality (8) Men and women of full age have the right to marry and find a family (9) Everyone has the right to own property. (10) Right to Freedom of thought, conscience and religion. (11) Freedom of opinion and expression. (12) Freedom of peaceful Assembly and Association. (13) Freedom to take part in the Government of his country.

(14) Right to employment (15) Right to equal pay for equal work. (16) All children enjoy the social protection. (17) Motherhood and Childhood are entitled to special care and assistance .

Human Rights in India: Our Constitution has incorporated many of the aspects of the Human Rights in the Preamble and Fundamental Rights.. The basic concepts of Preamble such as Liberty, Equality and Justice clearly reveal the Universal character of our constitution. Part III of our Constitution deals about the Fundamental Rights. They are (1) Right to Equality (2) Right to Freedom (3) Right against exploitation (4) Right to Freedom of Religion (5) Cultural and Educational Rights (6) Right to Property (7) Right to Constitutional Remedies.

Under the Fundamental Rights, right to the freedom includes freedom of Speech and expression, freedom of Assembly, freedom of Association, freedom of Movement, freedom of Residence and settlement and freedom of Profession. In order to protect the above Rights and Freedom,the Human Rights Commission was established in India.

National and State Human Rights Commission: National Human Rights Commission was founded on 12.10.1993 by the Government of India at Delhi. It consists of retired Supreme Court Judge as Chairman and four other experts who are appointed for a term of five years.. It has judicial powers to protect and promote Human Rights. As per the guidelines of the Central Government,. State Human Rights Commission is set up in every State in 1996. The headquarters of Tamilnadu State Human Rights Commission is at Chennai. It deals the cases related to Human Rights violation. The National and State Human Rights Commission play an important role in protecting the Human Rights of the people in India.

Need to protect Human rights: The causes for Human Rights violation differ from State to State. The Commission give more priority

for protecting the articles of the Human Rights Declaration and our Fundemental Rights. However the weaker section and downtrodden people are the victims of Human Rights violation. State and Central Government are taking serious steps to avoid the violation of Human Rights, for example The Protection of Civil Rights Act 1955 and the

Scheduled Caste and Scheduled Tribe Act (1989) are effectively implemented in India. Human Rights and Social Justice wing is functioning for this purpose under the Control of Director General of Police. At the State level, State Vigilance and Monitoring Committee is functiong with Hon'ble Chief Minister as the chair person. During 2003-2004 a sum of Rs.224.72 lakhs has been spent and 1772 persons have been benefited.

WOMEN RIGHTS

The Independant India witnessed many forces of social change particularly towards women. Realising the sufferings and hardships of women, the Government of India passed many legislations to remove the injustice done to women. These legislation paved the way for the upliftment and progress of women. Constitution of India guaranteed the equality of sex and special favour to women (Article of 14,15,16, of our Constitution). Besides the constitutional guarantee, the Government also passed many social legislations for the welfare of women.

Social legislations for Women:

(1) The Hindu Marriage Act of 1955 stipulate the marriageable age as 18,but now amended to 21 for women.

(2) The Hindu Succession Act of 1956 ensures the right to inherit their parental property.

(3) The Dowry Prohibition Act of 1961 (amended in 1984) gives severe punishment with imprisonment for the dowry seekers..

(4) The Hindu Widow Remarriage Act of 1956 legalised the widow remarriage.

(5) The Hindu Marriage Act (Tamilnadu Governement Amendement Act of 1967 gave legal sanction to the self respect marriages. .

(6) The Hindu Succession Act of 1989 (Tamilnadu Amendment Act) provides right to have equal share in the inheritance property.

(7) The Indecent Representation Act (Tamilnadu Government) of 1999 prohibits the indecent representation of women in magazines, newspapers, posters, handbills etc.

Labour legislations for Women: The Government of India has also enacted a number of women labour laws for the protection of working women. The Factory Act of 1948, Mines Act of 1952, Plantation Labour Act of 1951 were passed to protect and regulate the wages to women without any discrimination. The Maternity Benefit Act of 1961 assures maternity leave to the pregnant women with regular pay and wages.

All the above legislations, no doubt enhanced the status of women. But the legislations can only ensure legal equality, to make it reality there is a need for high movement to raise the social consciousness.

Women leaders: Kasturba Gandhi, Dr.Annie Besant, Sarojini Naidu, Vijayalakshmi Pandit, Kamala Nehru, Pandit Rama Bai, Dr.Muthulakshmi Reddy, Ruckmani Lakshmi Pathy, Ambujammal and Sister Subbulakshmi were some of the women leaders who fought for the rights of women. In 1995 women from all over the world gathered at Beijing the Capital of China with the message "Women's Rights are Human Rights" and Human Rights are Women's Rights"

Every year 8th March is celebrated as International Women's day

Women's Associations: A number of Women's Association in

Kiran Bedi, India's first female IPS officer successfully reformed the Tihar jail, the toughest prison India. She has become a popular role model among the women population. In 1994, she was awarded Ramon Magsaysay Award (Asian Nobel Prize) .

India and Tamilnadu in particular are working for the cause of empowering women. The most popular associations are the Women Indian Association, All Indian Women's Conference, National Council for Women in India, Democratic Women's Association and Pennurimai Iyakkam. Apart from this the non governmental voluntary organisations like Lions Club and Rotary Club and Inner Wheel of Club are also working hard for the empowerment of women.

Learning Outcome

1. **Understood the Human Rights declared by UN.**
2. **Understood the Fundamental Rights of our Constitution.**
3. **Understood the Women's Rights and their importance.**

SELF EVALUATION

I. Fill in the Blanks:

1. American Bill of Rights was passed in the year ----------.
2. UNO came into existence on ----------.
3. UN adopted the Universal Declaration of Human Rights on ---------.
4. National Human Rights Commission was founded in ----------.
5. Maternity benefit Act was passed in the year ----------.
6. In 1995 World Women's Conference was held at ----------.

II. Match the following:

1. Magna Carta	1955
2. Hitler	March 8th

3.	Hindu Marriage Act	Capital of China
4.	Bejing	Dictator
5.	International Women's day	1215

III. Answer the following briefly:

1. What are the basic rights of man?
2. Write the earlier documents that protected the Rights of Man.
3. Write a note on the Human Rights Commission.
4. Mention the women leaders who fought for Women's Rights.
5. What were the labour legislations passed for working women.

IV. Answer in Detail:

1. Write about the Human Rights declared by the UN.
2. How are the Women's rights protected by our Government.

Practical Activities

1. Arrange for a debate on Human Rights.
2. Prepare a chart depicting the various welfare legislation for women.

GEOGRAPHY

INTRODUCTION

Let us recall in brief about what we have learnt in the previous classes. In the VI Std, we learnt that the Sun is a star and it consists of mainly hydrogen and helium gases. A gaseous ring got separated from the Sun about 5 billion years ago. Over time the ring condensed, fragmented and formed the planets such as: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus, Neptune, Pluto and about 90 moons (satellites). Our Earth , a planet of the Sun's family is positioned at a distance from the Sun that makes its position conducive for the origin as well as for the growth of the living organisms. Hence our Earth is considered to be a unique planet because of the life forms that exist on its surface.

In the VII Std., we have learnt and understood that the blanket of air that envelops the Earth is the atmosphere and has no definite outer edge. It gradually becomes thinner and merges into space. Over 80% of atmospheric gases are held by gravity within 20 kilometers of the Earth's surface. The physical and chemical structure of the atmosphere, the way that the gases interact with solar energy, combine to make the atmosphere an integral part of the Earth system.

Many people have been inspired by the earth's mountains, fascinated by the spectacle of volcanic eruptions and terrified by the power of earthquakes and wondered about the size of the restless oceans.Through erosion the surface of the earth is constantly being sculptured into new forms. Let us continue to learn more about our mobile planet in the VIII Std. and understand **"how the earth works"** to destroy and create the physical landscapes on the Earth's surface.

1. STRUCTURE OF THE EARTH

Learning Objectives
1. Understands the interior of the Earth
2. Knows about the layers of the Earth

The Sun is a star and there are nine planets in the sun's (solar) family. These nine planets with their moons (satellites) revolve around the Sun. All the planets in this family are controlled by the gravitational force of the Sun. These planets revolve around the Sun in their respective paths while spinning on their own axis. Our earth is one among them and receives its light energy from the Sun . Similarly the other planets of the solar system also receive the light energy only from the Sun .

Scientists believe the Earth began its life about 4.6 billion years ago. The Earth formed as cosmic dust lumped together to make larger and larger particles. The continents probably began forming about 4.2 billion years ago as the Earth continued to cool. But it was not until the turn of the 20th century that scientists determined that our planet is made up of three main layers: the core, mantle, and crust (Fig.No.1.1).

1. The Core: The core is approximately 7000 kms. in diameter and is located at the Earth's centre. It is composed mostly of iron and the average temperature of the core is about 3000^0 C . This temperature is greater than the melting point of the rocks. Hence, the rocks in the core are not in a solid state. The core is composed of two layers: the inner and outer cores. The outer core is so hot that it is **molten**, with about 10% sulphur. It has an average thickness of about 2250 kilometers and surrounds the inner core. The inner core is under

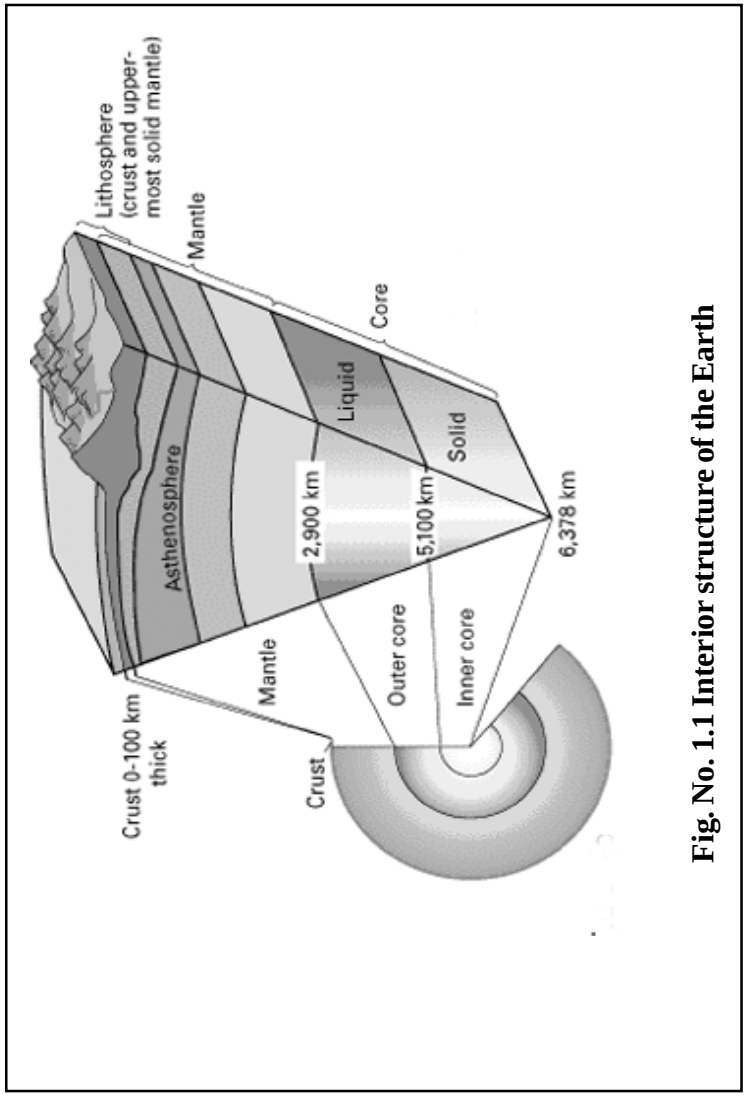


Fig. No. 1.1 Interior structure of the Earth

such extreme pressure that it remains solid with a thickness of about 1220 kilometers.

2. The Mantle: The mantle surrounds the core and has a thickness of 2900kms. It is composed of iron, magnesium, aluminum, silicon, and oxygen silicate compounds. The mantle is almost 2900 kilometers thick and comprises about 83 % of the Earth's volume. The mantle is divided into two layers. They are: a. upper mantle and b. lower mantle.

a.Upper mantle: The upper mantle exists from the base of the crust downward to a depth of about 670 kilometers. The top layer of the upper mantle, 100 to 200 kilometers is known as **asthenosphere**. This layer has physical properties that are different from the rest of the upper mantle.

b. Lower mantle: Below the upper mantle is the lower mantle that extends from 670 to 2900 kilometers below the Earth's surface. This layer is hot and plastic.The higher pressure in this layer causes the formation of minerals that are different from those of the upper mantle.

3. The Crust: The crust floats on top of the mantle. The crust is cool, rigid, and brittle. Two types of crust can be identified: the crust below the ocean water is the **oceanic crust** and the crust on the land is the **continental crust**.

a. The oceanic crust: The oceanic crust is thin and measures between 5 to 10 kilometers thick. It is composed of 40 per cent silica, 40 percent magnesium and 20 percent iron and other minerals. This is also refered as SIMA which is derived from the first two letters of **si**lica and **ma**gnesium. The rocks in the SIMA belong to basaltic variety. They are heavy because of their high density.

b. The continental crust: The continental crust is 20 to 70 kilometers thick. This crust is composed of 80 per cent silica and 15 per cent

aluminum. The remaining 5 per cent is composed of other rocks. This is also referred as **SIAL** layer which is derived from the first two letters of **si**lica and **al**uminum. The rocks in the SIAL layer belong to granite variety. They are light because of their low density. Continental crust is thinnest beneath mountain ranges and extends into the mantle.

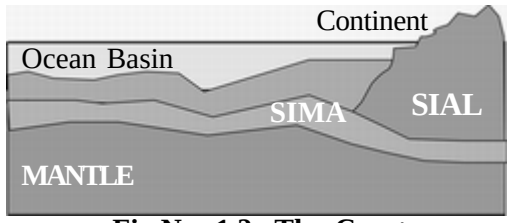


Fig.No. 1.2 The Crust

We have already learnt in the lower classes that the gaseous ring that was separated from the Sun cooled and turned into liquid state. At that time the densest heavy molten sima sunk to the bottom of the Earth's crust. The molten sial which are less dense and light stayed on the upper part of the Earth's crust. Over a period of time, these two layers solidified into hard rocks in their respective places (Fig.No1.2).

We can understand this structure with an example. Fill a vessel with water. Pour some oil in the vessel and observe. The oil do not sink but float on the surface of the water. The density of oil is less than the density of water. Hence the oil floats on the surface of the water. Likewise, the less dense and light SIAL materials floated over the dense and heavy SIMA materials, when they were in molten stage. When they solidified at their respective places SIAL rocks formed the upper layer and SIMA rocks formed the lower layer of the Earth's crust. SIMA rocks are continuous and surrounds the earth at the bottom of the ocean floor. Unlike the SIMA, the SIAL rocks are in segments on top of the SIMA .

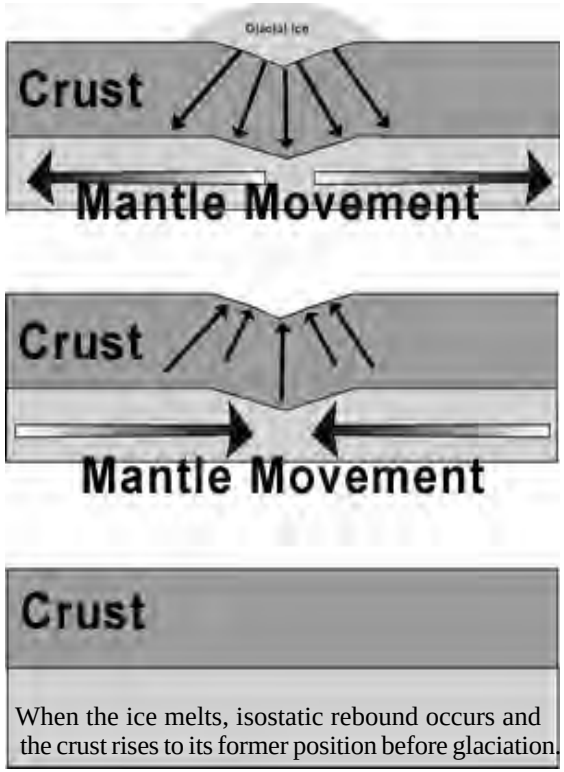
Most of the earth's interior is so hot that the rock melts. Just as a pot of hot milk on the stove will bubble as it is heated; the molten

Did you know?

One interesting property of the continental and oceanic crust is that these have the ability to rise and sink . This phenomenon, known as isostacy, occurs because the crust floats on top of the mantle like ice cubes in water. When the Earth's crust gains weight due to mountain building or glaciation, it deforms and sinks deeper into the mantle. If the weight is removed, the crust becomes more buoyant and floats higher in the mantle.

This process explains recent changes in the height in coastal areas of eastern and northern Canada and Scandinavia. Some locations in these regions of the world has been rising over past several thousand years. Uplifting of almost 300 meters has occured in the Hudson bay region. Both of these areas where covered by massive glacial ice sheetsabout 10,000 years ago. The weight of the ice sheets pushed the crust deeper into the mantle because of the three kilometer-thick mass of ice accumulated. Following the removal of this immense load, the crust has been adjusting gradually by rebounding upward eversince.

The addition of glacial ice on the Earth's surface causes the crust to deform and sink .



When the ice melts, isostatic rebound occurs and the crust rises to its former position before glaciation.

rock, very slowly heats up under the surface of the Earth. The crust that floats on the magma moves with it, like the skin that might form on the hot milk. Due to tremendous pressure in the middle of the Earth, though the magma is very hot, it is not in liquid state. Therefore it moves only a few centimeters a year. Millions of years of slow movement of magma adds up to a lot of movement on the crust. Let us learn about the movement of the Earth's crust in the following lessons.

Learning Outcomes

1. **Understood that the Earth is made up of three layers.**
2. **Understood that the Earth's surface has a solid crust outside and molten magma in the interior.**

Points to remember:

1. Earth is made up of three main layers: the core, mantle, and crust.The core is located at the Earth's centre. The mantle surrounds the core. The crust floats on top of the mantle.
2. The top layer of the upper mantle is called the asthenosphere. This layer has physical properties that are different from the rest of the upper mantle.
3. The rocks in the lower layer of Earth's crust is known as SIMA because they are made up of mostly silica and magnesium.
4. The upper rocky layer of the Earth's crust is called SIAL because these rocks are mostly made up of silica and Aluminum.

EXERCISES

I. Choose the correct answer:

1. The planets are controlled by the gravitational force of the
   a) Sun b) Earth c) Moon
2. The top layer of the upper mantle is called the
   a) Core b) Asthenosphere c) Crust
3. In the middle of the Earth, magma is not in
   a) Gaseous state b) Liquid state. c) Solid state

II. Fill in the blanks

1. The layer which is in molten state at greater depths of the Earth is known as ----------
2. The less dense portion of the Earth's crust is called ----------
3. The SIAL layer is made up of ---------- and ----------.
4. The core is composed of a ------- outer core and a ------- inner core.

III. Match the following

1. SIAL	Asthenosphere
2. Upper Mantle	Oceanic crust
3. SIMA	Inner core
4. Sun	Continental crust
5. Solid	A star
	Earth

IV. Answer briefly

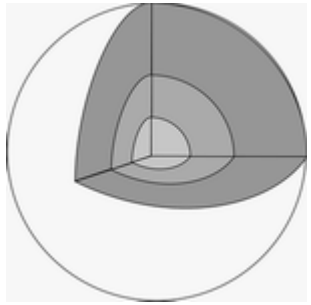
1. Why the inner core is solid?
2. What is the composition of mantle rocks?
3. Describe briefly about the asthenosphere.
4. What are SIAL rocks?
5. Write a brief note on oceanic crust.

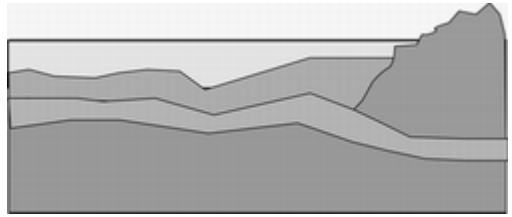
V. Explain in detail

1. Explain in your own words about the different layers of the Earth.

ACTIVITIES

Label the following diagrams





2. EARTH MOVEMENTS

Learning Objectives

1. **Understands the concept of mobile Earth.**
2. **Knows about the movement of the Earth.**
3. **Learns about the mountain building processes.**

During the last few decades spectacular developments have taken place in the field of Earth Sciences. Due to vast accumulation of new data, our idea about the structure and workings of the Earth have changed dramatically. Scientists now realise that the postions of landmasses are not fixed, but move around. During the 19th and early 20th centuries, several scientists suggested that the continental masses had the ability to move across the Earth's surface.

1. Continental drift : In the year 1912, the concept of **"Continental Drift"** was putforth by Alfred Wagner, a German meteorologist. He suggested that a super continent called **Pangea**

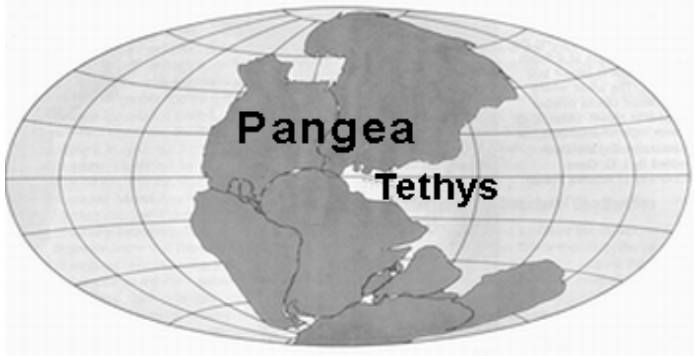


Fig. No.2.1 The Super Continent

once existed (Fig.No.2.1). He further stated that about 200 million years ago this super continent began breaking into smaller continents;

which then drifted to their present positions. This early theory of continental drift was based on the following evidences:

1. Locations of identical fossil occurrences in some of the continents masses suggests that these continents have been connected in the geological past.
2. Paleo- climatic evidence indicates that the tropical regions on some continents had polar climates in the past. This may indicate that these regions were located at different latitudes in the past.
3. East coast of South America and west coast of Africa fit together at a depth of 900 meters like a zigzag puzzle.
4. Some geologic deposits of rocks on the East coast of North and South America are similar to deposits on the west coast of Europe and Africa.

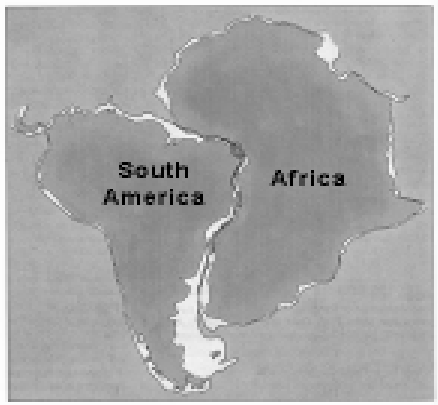


Fig.No.2.2 The best fit of South America and Africa

During the first 30 years of 20th century, the theory of continental drift was actively debated among geo-scientists. However, during the next 30 year period, debate on this theory waned because of the inability of scientists to propose a mechanism for the cause of the continental movement. Nothing much happend between the time of Wagners death in 1930 and early 1950.

2. Sea Floor Spreading : During 1950s and 1960s great technological advances permitted extensive detailed mapping of the sea floor. From mapping the sea-floor, came the discovery of the existence of oceanic mountain ranges similar to that of the mountain ranges on the land.

One such mountain range is the Mid-Atlantic Ridge, the largest mountain range in the ocean.In the early 1960s, this newly discovered evidence was consolidated and a new theory called **Sea-floor spreading** was proposed.

According to the theory, the ocean ridges are located above upwelling portions of the mantle. As the raising magma from the mantle spreads laterally, sea floor moves away from the ridge(Fig.No.2.3). As the seafloor moves, newly formed crust replaces it. The conclusive evidence to support this theory came a few years later. By 1968, the concept of continental drift and sea-floor spreading were united into a new theory known as **Plate Tectonics.**

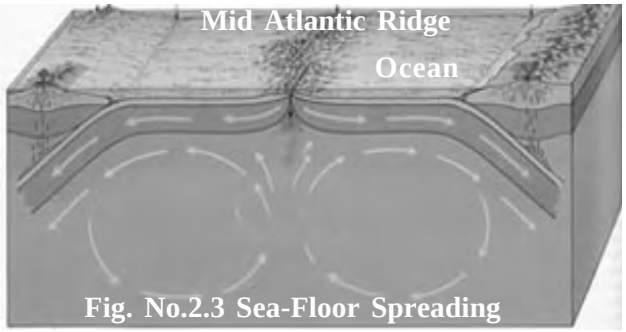


Fig. No.2.3 Sea-Floor Spreading

3. Plate Tectonics : T he theory of plate tectonics offered new and more scientifically sound explanations for a number of observed geologic phenomena. The plate tectonics states that the outer rigid lithosphere consists of several individual segments called plates. So far a dozen or so large plates and numerous smaller plates have been identified. You'll notice that most plates are part continental and part oceanic. Take the North American plate, for example. Its western half is dominated by the North American continent, but its eastern half forms part of the Atlantic Ocean basin. In comparison, the Pacific plate is essentially all oceanic. These plates are irregularly shaped and vary in thickness. (Fig.No.2.4). Tectonic plates are constantly on the move. The fastest plate races along at 15 centimeters per year while the slowest plates crawl at less than 2.5 centimeters per year.

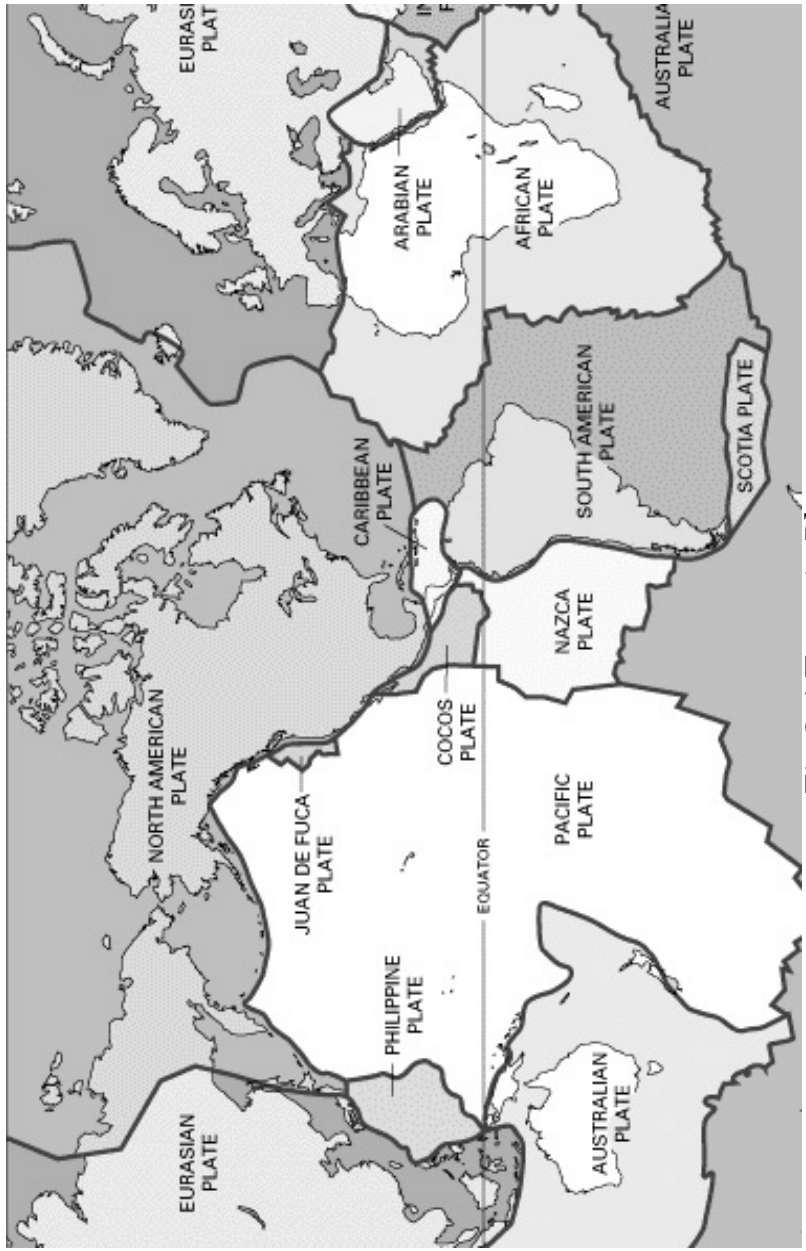


Fig.2.4 Tectonic Plates

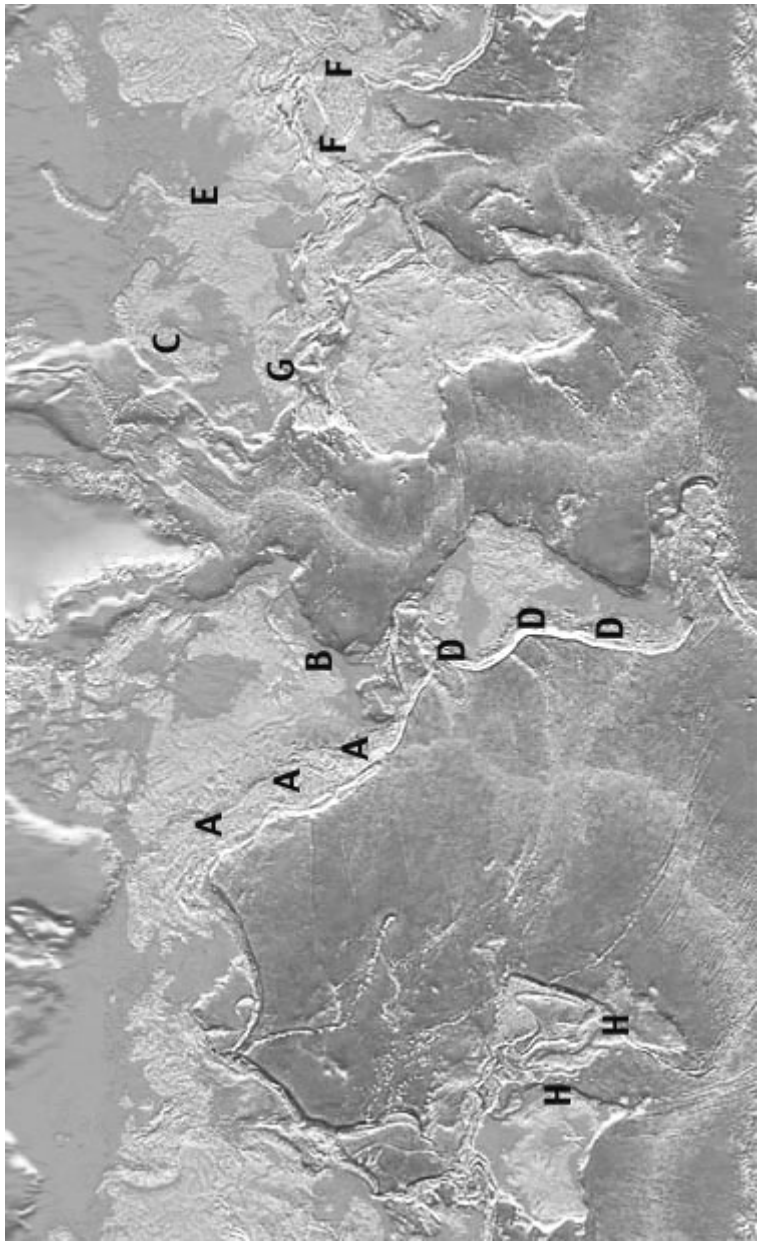


Fig.No. 2.6 Some of the major mountain belts on the Earth are the North American Cordillera (**A**), Appalachians (**B**), Caledonian Belt(**C**), Andes (**D**), Urals (**E**), Himalaya (**F**), Alps (**G**), and the Tasman Belt (**H**).

In some cases, plates can collide with each other; in other cases, plates may move away from each other. The rest move horizontally, sliding past one another. Such movements of tectonic plates creates many spectacular events such as mountain building, volcanoes, earthquakes. Many mountain systems of the world in particular, are created by the collision of continental plates. For example, the lofty mountains of Himalayas along the northern boarder of India is created by the coliosion of two continental plates.

I. Mountain Building: A mountain can be defined as an area of land that rises abruptly from the surrounding region. A mountain range is a succession of many closely spaced mountains covering a particular region of the Earth.

Mountain belts consist of several mountain ranges that run roughly parallel to each other. The Rockies , the Andes, the Himalayas, the Alps, and the Appalachians are all examples of mountain belts that

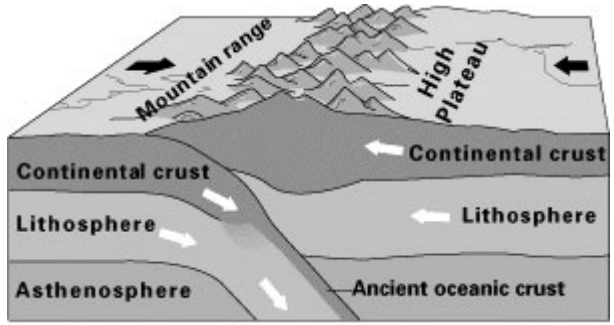


Fig.No. 2.5 Collision of two continental Plates

are composed of numerous mountain ranges. Many mountains were created by tectonic forces that elevate, fold, and fault rock materials. Such tectonic mountains can occur as a single range (the Urals) or as a belt of several mountain ranges (North American Cordillera). Figure 2.6 shows the location of some of the major mountain ranges found on the Earth's surface.

Through extensive scientific exploration over the last one hundred and fifty years, much has been learnt about the internal processes that generate spectacular mountain terrains. The processes that collectively produce a mountain system is called **Orogenesis**. The word orogenesis is derived from the Greek language , oros (mountain) and genesis (to come into being). There are two types of mountains. They are:

a.Fold mountains and b. Fault mountains

a. Fold mountains: The studies indicate that the most important cause of orogenesis is the collision (Fig.No.2.5) of two or more of tectonic plates. The tectonic forces generated in the interior of the earth cause continental crustal areas to collide. When this occurs the rocks between the two continental blocks become folded and faulted under compressional forces and are pushed upward to form fold mountains.

Among the most dramatic and visible creations of plate-tectonic forces are the lofty Himalayas. A continental collision began about 45 million years ago when India collided with Asia. India, which was once a part of Antarctica, split from that continent and moved a few thousand kilometers due north before collision occurred. This resulted in the formation of the spectacular Himalayan Mountains and the Tibetan Highlands. At present, the movement of India continues to put enormous pressure on the Asian continent, and Tibet in turn presses on the landmass to the north. The net effect of plate-tectonics forces acting on this geologically complicated region is to squeeze parts of Asia eastward toward the Pacific Ocean.

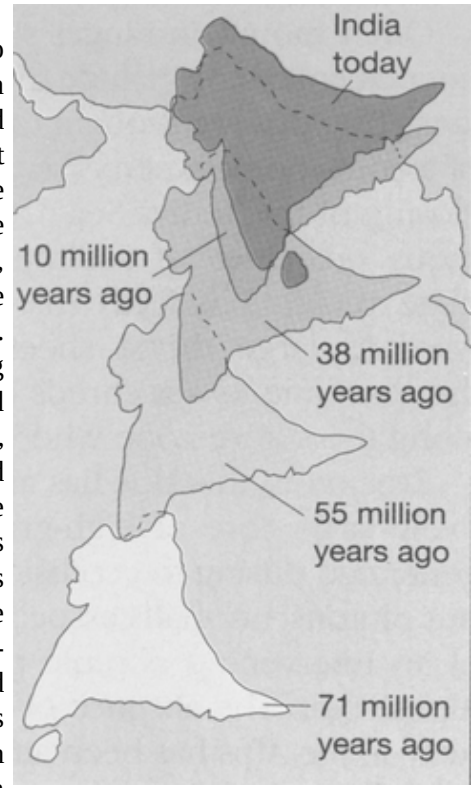
Other mountain ranges also show evidence of continental collisions. For example, the Alps are thought to have formed as a result of a collision between Africa and Europe during the closing of the Tethys sea.

b. Fault block mountains : Sometimes the tectonic forces generated in the interior of the earth may cause continental crustal areas to form

Did you know?

About 225 million years ago, India was a large island still situated off the Australian coast. A vast ocean called Tethys Sea separated India from the Asian continent.When the super continent called Pangaea broke apart about 200 million years ago, India began to forge northward. The scientists have reconstructed India's north ward journey. About 80 million years ago, India was located roughly 6,400 km south of the Asian continent, moving northward at a rate of about 9 m. a century.

When India rammed into Asia about 40 to 50 million years ago, its northward advance slowed by about half, because both these continental landmasses have about the same rock density, one plate could not be subducted under the other. The pressure of the impinging plates could only be relieved only by thrusting skyward, forming the jagged Himalayan peaks with more than 30 peaks rising to heights greater than 7,300 meters above sea level. These include Everest, Kanchen-junga, Makalu, and Dhaulagiri. The width of this mountain system varies from 200 to 400 kilometers from south to north, and the average height is 6,100 meters. In just 50 million years, peaks such as Mt. Everest have risen to heights of more than 8 km.



Position of India at various times

faults. Faults form in rocks when the forces overcome the internal strength of the rock resulting in a fracture. This can occur in any direction with the blocks moving away from each other. A series of faults occur due to the horizontal tensional forces in brittle rocks of the lithosphere

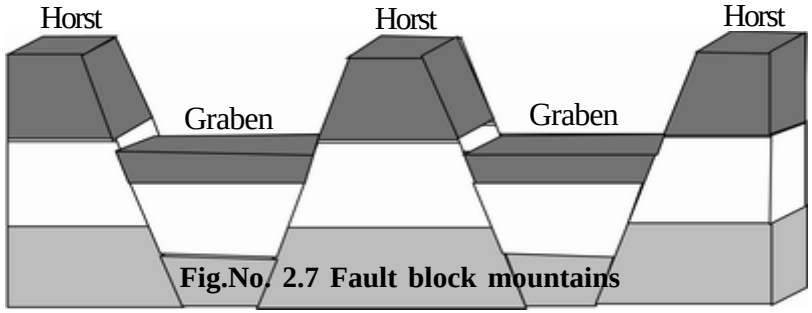


Fig.No. 2.7 Fault block mountains

as shown in the figure2.7. In such a case the down-dropped blocks form grabens and the uplifted blocks form horsts.

In areas where such faults have recently affected the crust, the grabens may form rift valleys. The East African Rift Valley is an example of an area where the continental crust has created such a rift. Similarly the uplifted horst blocks may form linear mountain ranges. Such linear mountain ranges are called fault block mountains. The basin and range province of the western U.S. is a good example where the basins are grabens, and the ranges are uplifted horst blocks.

II. Synclinal valleys: The valleys that separate mountain ranges on

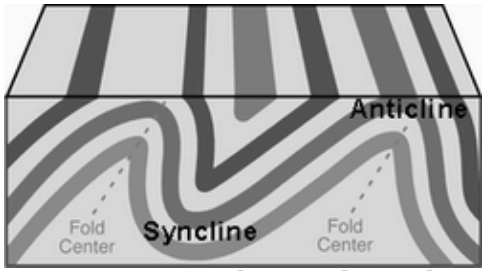


Fig.No. 2.8 Synclines and Anticlines

the surface of the continent are called **synclinal valleys.** This type of valley is especially noticeable when two continental crustal areas collide

and the rocks in between them become folded. Some of the folds are down and some are up. The down folds called synclines, are the valleys between the ridges. The up folds called anticlines, are tops of the mountain ridges (Fig.No. 2.8).

In some instances, the formation of a valley seems to be directly connected with the formation of the mountains that flank it. A very good example is the Death Valley, in the Southwest United States. Death Valley is bordered on the east and west by two small mountain ranges that are young and still growing. As these ranges grow in height, they also move farther apart. The broad expanse of rock between them issteadily dropping into the slot left by the separating ranges. As a result, Death Valley, already the lowest spot in the United States, century by century is getting lower. Death Valley is a very special case, the result of an unusual pattern of movement in the surrounding mountains.

We have learnt so far that the collision of continental plates created lofty mountains such as Himalayas. Some mountains are volcanic in origin. They are formed where rising magma breaks through the Earth's surface. Volcanic mountains tend to have sporadic distributions within a mountain range or can occur alone because of a localized hot spot like Hawaiian Islands. Let us continue to learn more about the volcanic mountains in the following lessons.

Learning Outcomes

1. **Understood the concept of continental drfit.**
2. **Understood that the forces that build mountains.**
3. **Understood that the Himalayas were formed as a result of the Plate collisions.**

Points to remember:

1. The Concept of Continental drift suggests that a super continent called Pangea once existed. About 200 million years ago this super continent began breaking into smaller continents, which then drifted to their present positions.

2. Plate tectonic theory states that the outer rigid lithosphere consists of several individual segments called plates and these plates are constantly on the move.
3. A mountain can be defined as an area of land that rises abruptly from the surrounding region. A mountain range is a succession of many closely spaced mountains covering a particular region of the Earth. Mountain belts consist of several mountain ranges that run roughly parallel to each other.
4. India, which was once a part of Antarctica, split from that continent and moved a few thousand kilometers due north before collision occurred. It collided with Asia about 45 million years ago .The result was the spectacular Himalayan Mountains and the Tibetan Highlands.
5. When series of faults occur in the lithosphere grabens and horsts are formed. The grabens are down-dropped blocks form grabens and the uplifted blocks form horsts.
6. The valleys between the ridges are called synclines. The top of the mountain ridges are called anticlines.

EXERCISES

I. Choose the correct answer:

1. An area of land that rises abruptly from the surrounding region.
   a) Mountain b) Mountain range c) Mountain belt
2. A mountain range along the northern border of India is
   a) Alps b) Andes c) Himalayas
3. Alfred Wagner proposed the concept of
   a) Sea floor spreading b) Plate tectonics c) Continental drift

II. Fill in the blanks

1. A ---------- is a succession of many closely spaced mountains covering a particular region of the Earth.
2. The processes that collectively produce a mountain system is called **----------.**
3. A vast ocean called ---------- Sea separated India from the Asian continent.
4. The most important cause of orogenesis is the ---------- of two or more of lithospheric plates.
5. Linear mountain ranges are called ---------- mountains

III. Match the following

1. Plate-tectonic	downfold
2. Anticlines	linear mountains
3. Syncline	upfolds
4. Death valley	lithosphere
5. Horst	collision
	USA

IV. Answer briefly

1. What is plate tectonics?.
2. Describe the salient features of drift theory.
3. Describe the charactaristic features of the Himalayas.
4. Write a brief note on fault block mountain.

V. Explain in detail

1. Explain in your own words about the formation of Himalayas.
2. Give an account of various theories of earth movement.
3. Earth is a mobile planet- Explain.

ACTIVITIES

1. Show the distribution of mountains on a world map.
2. Dramatise the various movements of the tectonic plate.
3. Discuss about the formation of Himalayas

3.VOLCANOES

Learning Objectives
1. **Understands about the formation of a volcanoe.**
2. **Knows about the different types of volcanoes.**
3. **Learns about the activities of volcanoes.**

People have always been both fascinated by the spectacle of volcanic eruptions and terrified of their power. Eruptions of volcanic mountains are spectacular sights. In some eruptions, huge fiery clouds rise over the mountain , and glowing rivers of lava flow down its sides. In other eruptions, red-hot ash and cinders shoot out of the mountain top, and large chunks of hot rock are blasted high into the air. A few eruptions are so violent that they blow the mountain apart.

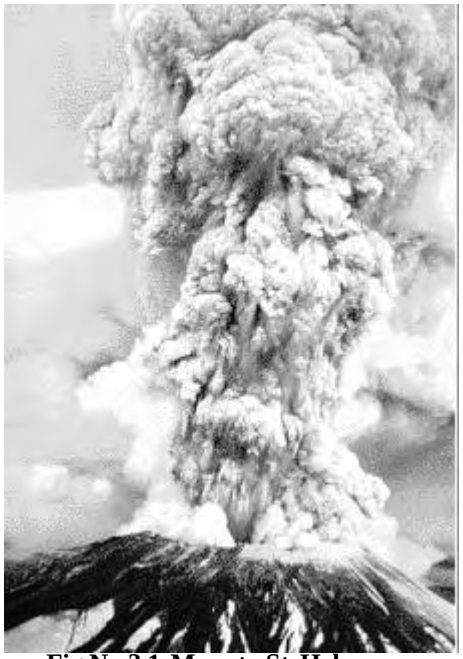


Fig.No.3.1 Mount St. Helens

Some eruptions occur on volcanic islands. Such islands are the tops of volcanic mountains that have been built up from the ocean floor by repeated eruptions. Other eruptions occur along narrow cracks in the ocean floor. In such eruptions, lava flows away from the cracks, building up the sea bottom.

Eruptions have caused some of the worst disasters in history, wiping out entire towns and killing thousands of people. One of the most spectacular volcanic eruptions in recorded history occurred in 1883 with the explosion of Krakatoa, an island in the Sunda Strait near Java. A more recent example is the dramatic 1980 eruption of Mount St. Helens in the Cascade Range in Washington State (Fig.No.3.1).

Structure of a volcanoe: Most magma forms 80 to 160 kilometers beneath the surface. Some develops at depths of 24 to 48 kilometers. As the magma rises, it melts gaps in the surrounding rock and forms a large chamber as close as 3 kilometers to the surface. This magma chamber is the reservoir from which volcanic materials erupt (Fig.No.3.2).

The gas-filled magma in the reservoir is under great pressure from the weight of the solid rock around it. This pressure causes the magma to blast or melt a conduit (channel) in a fractured or weakened part of the rock. The magma moves up through the conduit to the surface. When the magma nears the surface, the gas in the magma is released. The gas and magma blast out, an opening called the **central vent.**

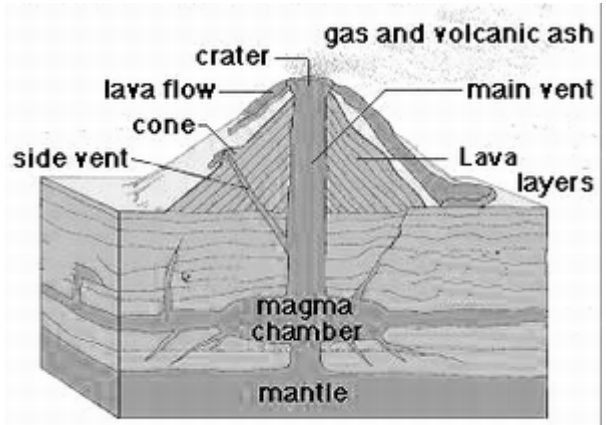


Fig.No.3.2 Cross section of a volcanoe

Most magma and other volcanic materials then erupt through this vent. The materials gradually pile up around the vent, forming a volcanic mountain, or volcanoe. After the eruption stops, a bowl like crater

generally forms at the top of the volcanoe. The vent lies at the bottom of the crater.

Gas pours out of volcanoes in large quantities during most eruptions. The gas is made up of chiefly steam. It also includes carbon dioxide, nitrogen, sulphur dioxide, and other gases. Volcanic gas carries a large amount of volcanic dust. This combination of gas and dust looks like black smoke.

Once a volcanoe has formed, not all the magma from later eruption reaches the surface through the central vent. As the magma rises, some of it may break through the conduit wall and branch out into smaller channels. The magma in these channels may escape through a vent formed in the side of the volcanoe or it may remain below the surface.

Lava is the name for magma that has escaped onto the earth's surface. When lava comes to the surface, it is red hot and may have a temperature of more than 1100 degrees C. Highly fluid lava flows rapidly down a volcanoe's slopes. Sticky lava flows more slowly. As the lava cools, it hardens into many different formations.

Formation of magma: Based on available scientific evidence, the earth's crust and mantle are composed primarily of solid rock. Further, although the outer core is a fluid, this iron-rich material is very dense and remains deep with in the Earth. If this is true what is the source of magma that produces the Earth's volcanic activity? The source of magma are: **a. Temperature b. Pressure and c. Water content**

a.Temperature: Since molten outer core is not the source of magma, geologists conclude that magma must originate from solid rock located in the crust and mantle. The most obvious way to generate magma from solid rock is to raise the temperature. Silica-rich rocks of granitic composition begin to melt at a temperature around 750^0C, whereas basaltic rock must reach a temperature of about 1000^0C before

melting commences. What is the source of heat that melts rock? One source is the heat liberated during the decay of radio active elements that are found in the mantle and the crust. Workers in underground mines have long been recognized that temperatures get higher as they decend to greater depths. Although the rate of temperature increase varies from place to place, it averages between 20^0C-30^0C per kilometer in the upper crust. This gradual increase in temperature with depth is known as the **geothermal gradient.**

The geothermal gradient produce magma in two important ways. First, magma produced within the mantle migrate to the base of the crust and intrude granatic rocks. Because granitic rock have a melting temperatures well below those required to melt basalt, heat derived from the hotter basaltic magma melts the already warm crustal rocks. Here basaltic magma from the mantle, transports heat to the crust, when granitic rocks generate explosive lavas.

Secondly, As shown in figure 3.3, at deep oceans, the plates of oceanic crust which is relatively cooler than the continental plates, descend into the hot mantle. Here heat supplied by the surrounding rocks are sufficient to melt the oceanic crust which dropped into the hot mantle. This produces basaltic magma.

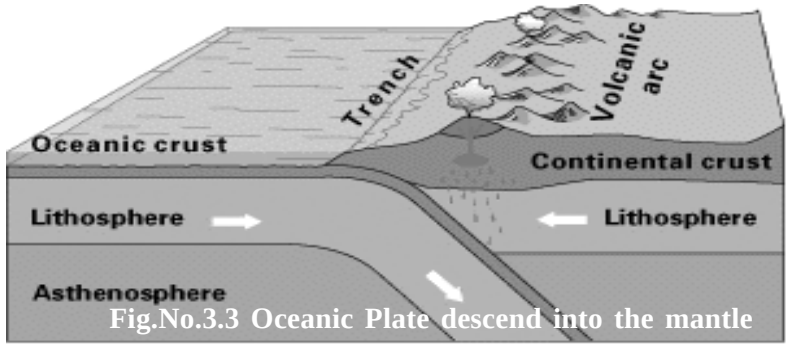


Fig.No.3.3 Oceanic Plate descend into the mantle

b. Pressure: If temperature is the only factor that determines the melting of rock, the Earth would be a molten ball covered wih a thin,

solid outer shell.This, ofcourse, is not the case. The reason is that pressure also increases with depth. An increase in pressure causes an increase in the rock's melting temperature and a reduction in pressure causes a decrease in rock's melting temperature. Consequently, a drop in pressure, can lower the melting temperature of the rock suffeciently to trigger melting. This occurs whenever a plate ascends, thereby moving into zones of lower pressure.

c. Water content: Another important factor affecting the melting temperature of the rock is its water content. In general, the more water present, the lower melting temperature. One important difference exists between the melting of a substance that consists of a single compound such as ice, and the melting point of igneous rock, which are mixtures of several different minerals. Whereas ice melts at a definite temperature, most igneous rocks melt over a temperature range of a few hundred degrees.

Kinds of Volcanoes: The eruptive history of each volcanoe is unique; consequently, all volcanoes are somewhat different in form and size. Nevertheless, volconogists have recognized that volcanoes exhibiting somewhat similar eruptive styles can be grouped. Based on their "typical" eruptive patterns and characteristic form, three groups of volcanoes can be recognized. They are: **i) shield volcanoes, ii) cinder cones, and iii) composite volcanoes.**

i. Shield Volcanoes: When a large amount of free-flowing lava spills from a central vent, the volcanoe takes the shape of a broad, slightly dome structured. This is called a shield volcanoe. Shield volcanoes are built primarily of basaltic lava flows (Fig.No. 3.4).

ii. Cinder cone : A cinder cone is a small volcano, between 100 and 400 meters tall, made up of exploded rock blasted out of a central vent at a high velocity (Fig. No. 3.5). These volcanoes develop from magma of basaltic to intermediate composition. They form when large amounts of gas accumulate within rising magma. In addion, they

frequently occur in groups. Examples of cider cones include Little Lake Volcano in California and Paricutin Volcano in Mexico.

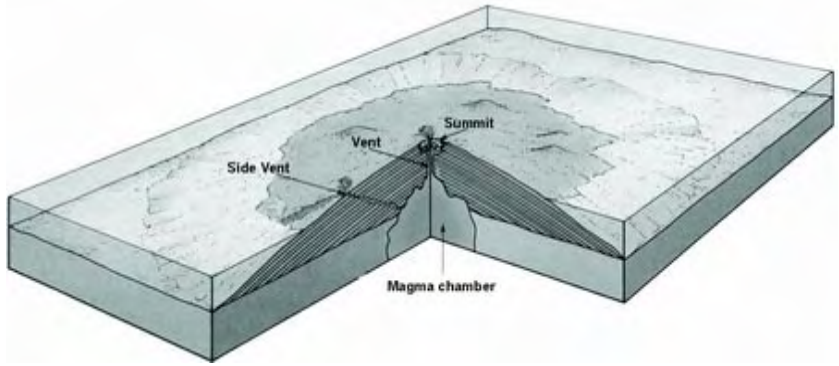


Fig.No. 3.4 Cross section of a shield volcanoe

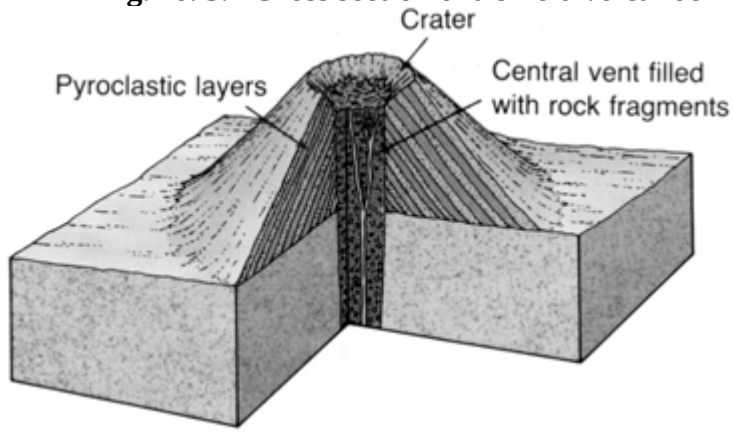


Fig.No. 3.5 Cross Section of a Cinder Cone Volcano

iii. Composite volcanoe: The earth's most picturesque volcones are termed composite cones (Fig.No.3.6). Composite volcanoes are made from alternate layers of lava flows and exploded rock . Their height ranges from 100 to 3500 meters tall. The chemistry of the magma of these volcanoes is quite variable ranging from basalt to granite. Magma that are more granitic tend to be very explosive because of their relatively higher water content. Water at high temperatures and pressures is extremely volatile.

Did you know?


Mauna Loa

Mauna Loa, probably the largest volcanoe on the Earth, is one of the five shield volcanoes that together make up the island of Hawaii. It's base rests on the ocean floor 5000 meters below sea level and its summit reach a height of 4170 meters above the water. Nearly one million years and numerous eruptive cycles were required to build this truly gigantic pile of volcanic rock.


Paricutin

Paricutin in western Mexico is a well-known cinder cone. In 1943, about 350 kms. west of Mexico City, the volcano errupted in a cornfield. The owers of the field witnessed the event as they were preparing the field for planting. On February 20th, around 4pm.smoke with a sulfurous odour arose from a small hole and hot, glowing rock fragments thrown into the air during night. By the next day the cone had grown to a height of 40 meters and by the fifth day it was over 100 meters high. At this time the explosive eruptions were throwing hot fragments 1000 meters above the crater rim. After nine years of activity ceased almost quickly as it began. Now Particutin is just another one of the numerous cinder cones dotting the landscape in this region of Mexico. Like the others it will probably not errupt again.

Although composite cones are the most pictureque, they also represent the most violent type of volcanic activity. Their eruption can be unexpected and devastating. Most active composite cones are located in a narrow zone, named the Ring of Fire that surrounds the

Pacific Ocean. Fujiyama in Japan, Mt.Mayaon in the Philippenes, and the picturesque volcones of Cascade Range in the Northwestern United States, including Mt.St.Helens are good examples of composit cone volcanoes. Mt. St. Helens, USA , has erupted several times since 1980, is one of the most active composite volcanoe of the world

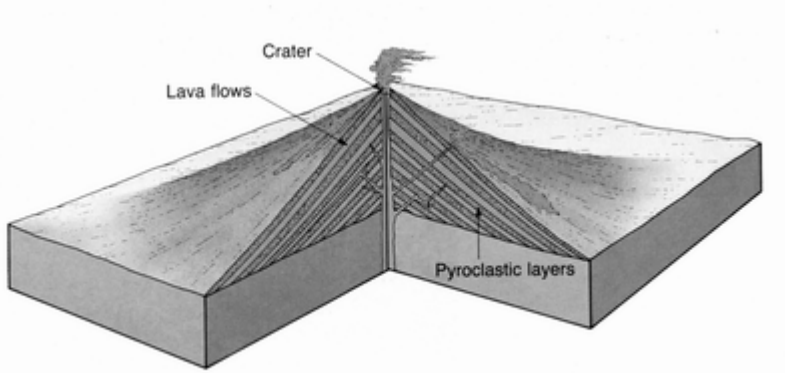


Fig. 3.6 Cross section of a Composite volcanoe

The Figure (3.7) below shows one such eruption of Mount St. Helens. The lateral eruption removed 2.8 cubic kilometers of rock

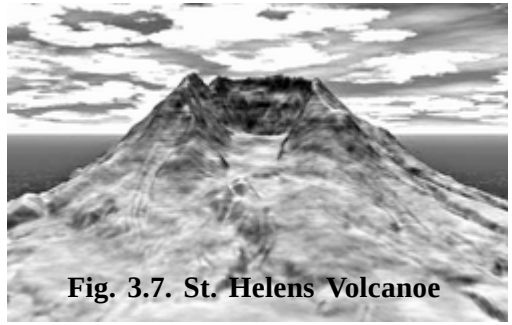
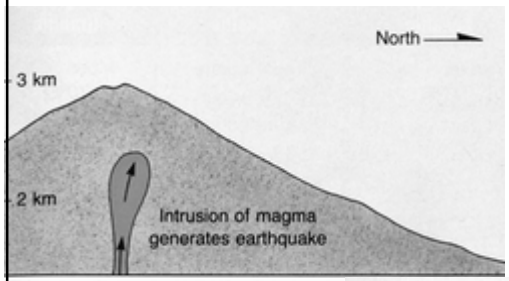


Fig. 3.7. St. Helens Volcanoe

and sediment from the volcano and lowered its height by 400 meters. Detectable amounts of ash were spread over 50,000 square kilometers of area surrounding the volcanoe. The large crater created by the explosive eruption is about 600 meters deep and can be seen in the centre.

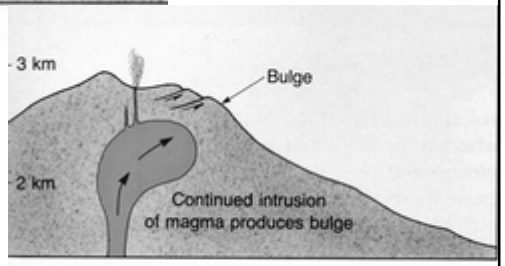
Idealized diagrams showing the eruption events of Mount St.Helens in the May 18,1980.



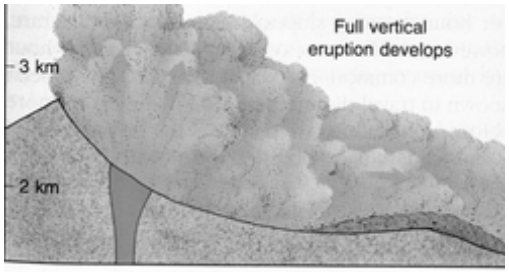
A. March 20, 1980

First, a sizeable earthquake recorded on Mount St.Helens indicates that renewed volcanic activity is possible.

Alarming growth of a bulge on the north flank suggests increasing magma pressure



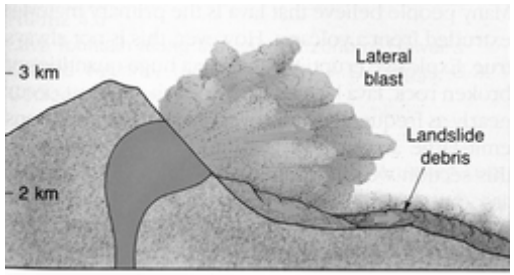
B. April 23, 1980



D. May 18, 1980

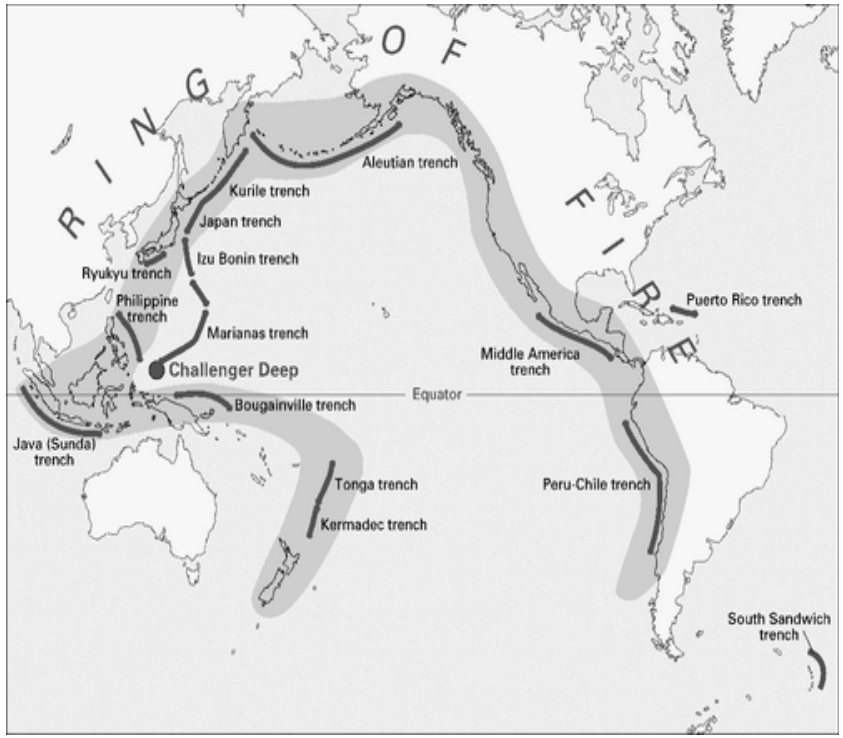
Triggered by an earthquake, a giant landslide relieved the confining pressure on the magma body and initiated an explosive lateral blast.

Within seconds, a large vertical eruption of volcanic ash to an altitude of about 19 kilometers. This phase of the eruption continued for over nine hours.



C. May 18, 1980

Distribution of Volcanoes: Nearly 800 volcanoes are active today or known to have been active in historical times. Of these, more than 75 percent are situated in the Pacific Ring of Fire. This belt partly coincides with the young mountain ranges of western North and South



Map 3.1 : Volcanic arcs and oceanic trenches partly encircling the Pacific Basin form the so-called Ring of Fire, a zone of frequent earthquakes and volcanic eruptions

America, and the volcanic island arcs fringing the north and western sides of the Pacific basin. The Mediterranean-Asian orogenic belt has few volcanoes, except for Indonesia and the Mediterranean where they are more numerous. Oceanic volcanoes are strung along the world's oceanic ridges, while the remaining active volcanoes are associated with the African rift valleys (Map.No.3.1).

Barren Island is the only active volcano in the Indian Subcontinent, located 135 km east of Port Blair, in east Andaman Sea and is a part of Andaman Nicobar chain of islands in the Indian Ocean (Fig.No.3.8). The Barren Island lies on the inner arc extending between Sumatra and Myanmar. The last volcanic activity in the island occurred in 1994-95. However, Indian Coast Guard informed the renewed activity (strong gas and, perhaps, lava emissions) in January 2000.

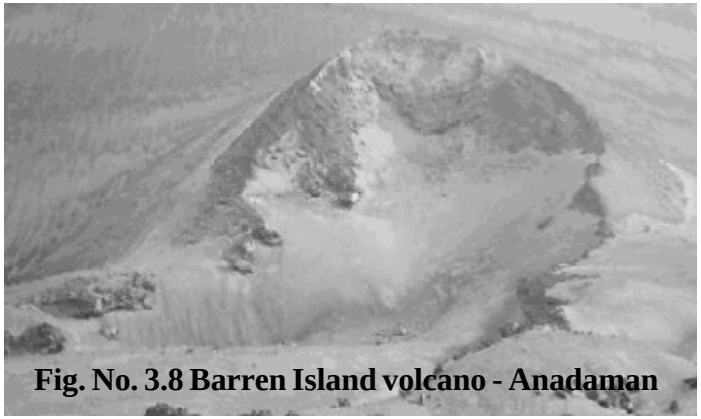


Fig. No. 3.8 Barren Island volcano - Anadaman

Most volcanic eruptions cannot be predicted. However, some volcanoes, such as those in Hawaii, have a **built-in warning system**. Before such a volcano erupts, it expands slightly as magma collects in the magma chamber. As the magma rises, many small earthquakes occur. The temperature in the surrounding area also begins to increase, and clouds of gas start to pour from the vent. Scientists use several devices to predict when such a volcanoe will erupt. They use an instrument called a **Tiltmeter** to measure the expansion of a volcanoe. **Thermometers** to check temperature increases in the area, and gas detectors to measure the amount of gas.

Lava Plateaus: Another spectacular feature associated with lava flow are the plateaus. Plateaus develop in many ways and occur in a variety of geologic settings. Lava plateaus are built by the accumulation

of basalt released by volcanic activity. Typical examples of these formations can be seen in Ethiopia, Somalia, the western United States, the Parana Basin, Iceland, and the Deccan Plateau of India.

Did you know?

The Deccan plateau are one of the largest volcanic provinces in the world. It consists of more than 2,000 m of flat-lying basalt lava

Ajantha Caves Curved in the basaltic lava

flows and covers an area of nearly 500,000 square km in west-central India. Estimates of the original area covered by the lava flows are as high as 1.5 million square km. The volume of basalt is estimated to be 512,000 cubic km . Most of the basalt erupted between 65 and 60 million years ago.

Benefits of Volcanoes : Although ,volcanoes are among the most destructive natural forces on the earth, the volcanoes also produce benefits. For example, many volcanic materials have important industrial and chemical uses. Rock formed from lava is commonly used in building roads. Pumice, a natural glass that comes from lava, is widely used for grinding and polishing stones, metals, and other materials. Sulfur deposits from volcanoes are used in making chemicals. Weathered volcanic ash greatly improves soil fertility.

In many volcanic regions, people use underground steam as a source of energy. This geothermal energy is used to produce electricity in

such countries as Italy, Mexico, New Zealand, and the United States. In Reykjavik, Iceland, most people heat their homes with water piped from volcanic hot springs.

Finally, volcanoes serve as "windows" to the earth's interior. The materials they erupt help scientists learn about conditions within the earth. Let us learn about the earthquakes and their impacts on human life in the next lession.

Learning Outcomes

1. **Understood about how volcanoes are formed.**
2. **Knew about the different type of volcanoes.**
3. **Learnt that the Barren Island is the only active volcano in the Indian Subcontinent**

Points to Remember:

1. Magma chamber is the reservoir from where volcanic materials erupt.This chamber is as close as 3 kilometers to the surface.
2. When the magma nears the surface, the gas in the magma is released. The gas and magma blast out, an opening called the central vent.
3. Volcanic mountain forms when magma is thrown up gradually pile up around the vent. After the eruption stops, a bowl like crater generally forms at the top of the volcanoe.
4. Lava is the name for magma that has escaped onto the earth's surface. When lava comes to the surface, it is red hot and may have a temperature of more than 1100 degrees C.
5. Gradual increase in temperature with depth is known as the geo-thermal gradient.
6. Shield Volcanoes are formed when a large amount of free-flowing lava spills from a vent and spreads widely. A cinder cone is a small volcano. They form when large amounts of gas accumulate within rising magma. Composite volcanoes are very explosive because of their relatively higher water content.
7. Barren Island is the only active volcano in the Indian Subcontinent, located 135 km. east of Port Blair, in east Andaman Sea and is part of the Andaman Nicobar chain of islands in the Indian Ocean.

8. Lava plateaus are built by the accumulation of basalt released by volcanic activity. The Deccan Traps are one of the largest volcanic provinces in the world.
9. Volcanic materials have important industrial and chemical uses. Rock formed from lava is commonly used in building roads. Pumice is widely used for grinding and polishing stones, metals, and other materials. Sulphur deposits from volcanoes are used in making chemicals.

EXERCISES

I. Choose the correct answer:

1. One of the most spectacular volcanic eruptions in recorded history, is the explosion of
   a) Krakatoa b) St.Helen c) Barren Islands
2. The most explosive type of volcanoe is the
   a) Cinder Cones b) caldera c) Shield Volcanoes
3. An underwater mountain range that runs down the length of the Atlantic Ocean.
   a) Mid-Atlantic Ridge b) Himalayan Range c) Appalachian

II. Fill in the blanks

1. When a large amount of free-flowing lava spills from a vent and spreads widely ---------- volcanoes are formed.
2. A ---------- is made up of exploded rock blasted out of a central vent at a high velocity.
3. The gas and magma blast out an opening called the ---------- vent.
4. Lava is the name for ---------- that has escaped onto the earth's surface.
5. Weathered ---------- greatly improves soil fertility.

III. Match the following

1. Barren Island	Deccan Traps
2. Mauna Loa	Java
3. Magma	vent
4. Lava Plateau	Hawaii
5. Volcanic material	India
	Lava

IV. Answer briefly

1. How are volcanoes formed ?
2. What is a shield volcanoe?
3. Describe the benefits of a volcanoe.
4. Write a brief note on Barren island volcanoe
5. What is geothermal gradient?

V. Explain in detail

1. Draw a cross section of a volcanoe and describe.
2. Write about the different types of volcanoes.
3. How magma is produced? Explain

ACTIVITIES

1. Collect information from the newspapers about the volcanic activities and prepare a picture album.

The New Indian Express: September 15th 2004
Lava and smoke rise from Mount Etna, on the southern Italian Island of Sicilly, during the earlier hours of Tuesday. A new fissure has opened on the south eastern side of the volcanoe.

4. EARTHQUAKES

Learning Objectives

1. **Knows the causes behind an earthquake.**
2. **Understands the effects of an earthquake.**
3. **Learns about the damages caused by earthquakes.**

Earthquakes are actually an everyday event. Every year, there are about 6,000 earthquakes as the earth's plates slip and slide past one another. However, most of these earthquakes are too small to be felt by us. Only about 500 quakes a year can be felt by people standing on the ground and, of these, only about 15 or so cause any damage. On an average about 10,000 people die each year as a result of earthquakes.

The oldest record about earthquakes come from the Chinese as early as the Shang Dynasty more than 3,000 years ago. Recently,

Did you know?

Bhuj in Gujarat , India experienced a major earthquake recently on January 26th 2001, The damage was extreme with nearly 20,000 people killed and over 150,000 injured.

Washington State, USA, was hit by the Nisqually Quake - on February 28th 2001 . This was a big quake, but luckily it struck about 65 kilometers underground so that it was not as strong on the surface as it was underground. Many buildings and bridges were damaged, but no one was killed. El Salvador in Central America has been hit by two major earthquakes recently. The country experienced an earthquake on January 13th and on February 13th 2001. These two earthquakes devastated the country. Altogether, the two quakes killed over 1,000 people and injured over 8,000 people. Nearly 100,000 homes were damaged and nearly 500 landslides added to the damage.

Earthquake Waves: Earthquakes are a form of wave energy that is transferred through bedrock. Motion is transmitted from the point of sudden energy release, i.e the earthquake focus, as spherical seismic waves that travel in all directions outward (Fig.No.4.1). The point on

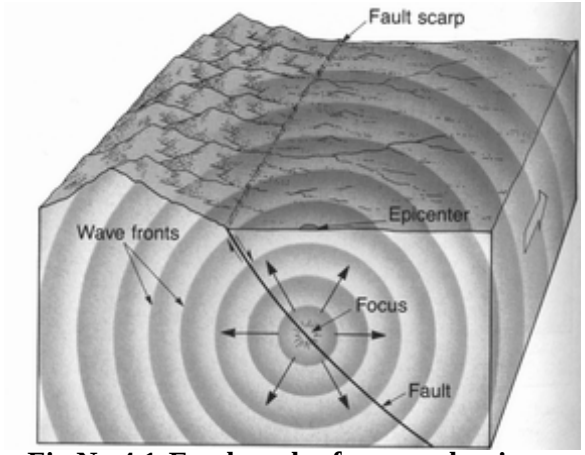


Fig.No.4.1 Earthquake focus and epicentre

the Earth's surface directly above the focus is termed the epicentre. Two different types of seismic waves have been described by geologists: 1.Body waves and 2.Surface waves.

1. Body waves: Body waves are seismic waves that travel through the lithosphere. Two kinds of body waves exist: **P-waves and S-waves.** Both of these waves produce a sharp jolt or shaking.

P-waves : P-waves or primary waves are formed by the alternate expansion and contraction of bedrock and cause the volume of the material they travel through to change.

They travel at a speed of about 5 to 7 kilometers per second through the lithosphere and about 8 kilometers per second in the asthenosphere. The speed of sound is about 0.30 kilometers per second. P-waves also have the ability to travel through solid, liquid, and gaseous materials. As the P-wave makes contact with the rock, the spacing between rock molecules contracts causing the volume of the material to decrease. The rock expands and returns to it original shape after the P-wave passes. When some P-waves move from the ground to the lower atmosphere, the sound wave that is produced can sometimes be heard by humans and animals.

b. S-waves: S-waves or secondary waves are a second type of body wave. These waves are slower than P-waves and can only move through solid materials. S-waves are produced by shear stresses and move the materials they pass through in a perpendicular (up and down or side to side) direction.

II. Surface waves : Surface waves travel at or near the Earth's surface. These waves produce a rolling or swaying motion causing the Earth's surface to behave like waves on the ocean. The velocity of these waves is slower than body waves. Despite their slow speed, these waves are particularly destructive to human construction because they cause considerable ground movement.

The world's major earthquakes occur within well-defined, long, narrow zones. One earthquake belt circles the Pacific Ocean along the mountainous west coasts of North and South America and runs through the island areas of Asia. A second, less active belt is between Europe and North Africa in the Mediterranean region and includes portions of Asia.

A major earthquake can cause enormous damage no matter where in the world it strikes. People and animals can be killed, buildings, bridges, roads, and sewer systems destroyed, and landslides, fires are triggered. Survivors of an earthquake may find themselves without food, water, or a place to live. And all because of a simple bump between two plates on the earth's surface. Earthquakes can strike anywhere in the world, wherever the earth's plates come together.

Tectonic Plates and Earthquakes:

The recently developed concept of plate tectonics in modern geology leaves little doubt that there is a causal relationship between the geometry of the world's tectonic plates and the geographical distribution of earthquakes. We have already learnt that the Earth crust is formed of several layers that have very different physical and chemical properties. The outer layer, which averages about 70 kilometers in thickness, consists of about a dozen large, irregularly shaped plates that slide over, under and past each other on top of the partly molten inner layer.

Most earthquakes occur at the boundaries where the plates meet. In fact, the locations of earthquakes and the kinds of ruptures they produce help scientists define the plate boundaries. There are three types of plate boundaries. They are: 1. Spreading zones, 2.Transform faults, and 3.Subduction zones.

1. Spreading zones (Fig.No.4.2a): At spreading zones, molten rock rises from the mantle, pushing two plates apart and adding new material at their edges. Most spreading zones are found in oceans; for example, the North American and Eurasian plates are spreading apart along the mid-Atlantic ridge. Spreading zones usually have earthquakes at shallow depths within 30 kilometers of the surface.

2. Transform faults (Fig.No.4.2b) : At transform Plates, plates slide past one another. An example of a transform-fault plate boundary

is the San Andreas fault, along the coast of California and northwestern Mexico. Earthquakes at transform faults tend to occur at shallow depths and form fairly straight linear patterns.

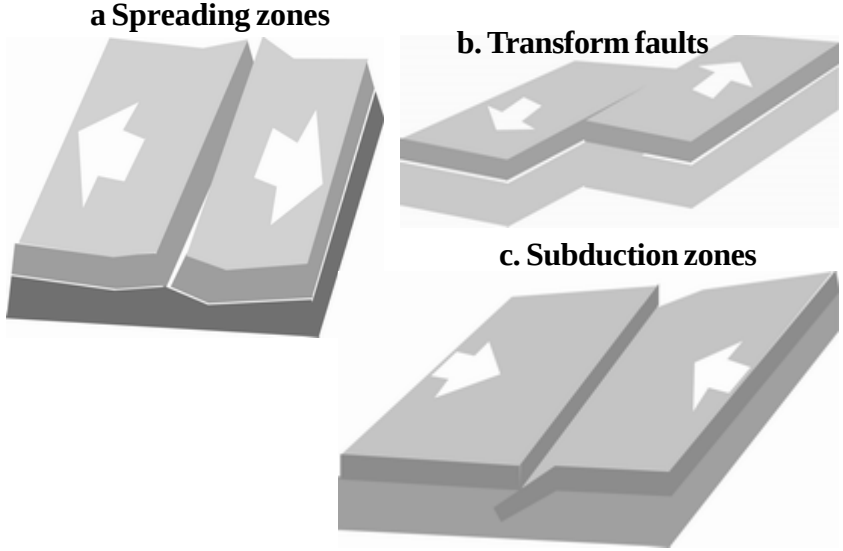


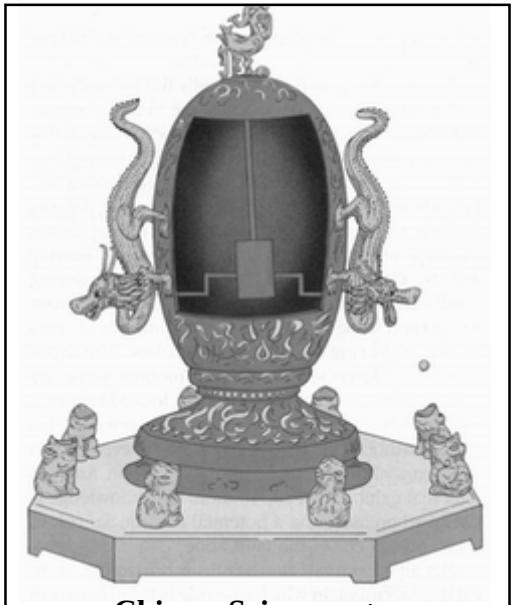
Fig 4.2 Tectonic Plates and Earthquakes

Subduction zones (Fig.No.4.2c): At subduction zone, one plate overrides, or subducts the other plate. The plate that is pushed downward enters into the mantle and it melts. An example of a subduction-zone plate boundary is found along the northwest coast of the United States, western Canada, southern Alaska and the Aleutian Islands. Subduction zones where shallow to deep earthquakes occur in subduction zones.

Earthquakes can also occur within plates, although plate-boundary earthquakes are much more common. Less than 10 percent of all earthquakes occur within plate interiors. As plates continue to move and plate boundaries change over geologic time, weakened boundary regions become part of the interiors of the plates. These zones of weakness within the continents can cause earthquakes in response to stresses that originate at the edges of the plate or in the deeper crust.

Did you know?

Almost 2000 years ago, Chinese made the first attempt to study the earthquake waves and to determine the direction from which these waves are originated. The seismic instrument used by the Chinese was a large hollow jar that probably contained a mass suspended from the top. This suspended mass similar to a clock pendulum was connected in some fashion to the jaws of several dragon figurines that encircled the container. The jaws of each dragon held a metal ball.



Chinese Seismometer

When earthquake waves reached the instrument, the relative motion between the suspended mass and the jar would dislodge some of the metal balls into the waiting mouths of frogs directly below. The Chinese were probably aware that the first strong ground motion from an earthquake is directional, and when it is strong enough, all poorly supported items will topple over in the same direction. Apparently the chinese used this fact plus the position of the dislodged ball to detect the direction to an earthquake's source.

Detecting Earthquakes:

Detecting an earthquake is much easier than predicting one. At its most simple level, a powerful earthquake can be felt by people in the area, and the damage it causes can be seen. Mechanical devices are used to detect earthquakes for hundreds of years.

In principle atleast, modern seismographs, instruments that record seismic waves, are like the device used by the early Chinese. Seismographs have a mass freely suspended from a support that is attached to the ground (Fig.No.4.3a). When the vibration from a distant

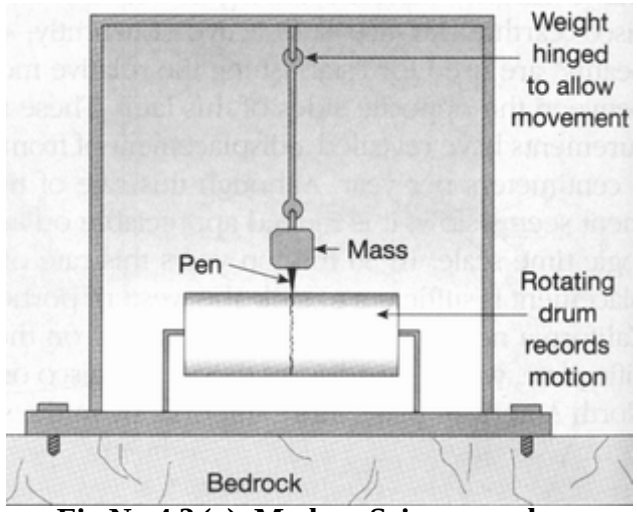


Fig.No.4.3 (a): Modern Seismograph

earthquake reaches the instrument, the mass relatively stationary, while the earth and support move. The movement of the earth in relation to the stationary mass is recorded on a rotating drum or magnetic tape.

Earthquakes cause both vertical and horizontal ground motion; therefore, more than one type of seismometer is needed. It is designed so that the mass is permitted to swing from side-to side and thus it detects horizontal ground motion. Usually two horizontal seismographs are employed, one oriented north-south and other placed with an east-

west orientation (Fig.No. 4.3b.). Vertical ground motion can be detected if the mass is suspended from a spring as shown in (Fig.No.4.3c.)

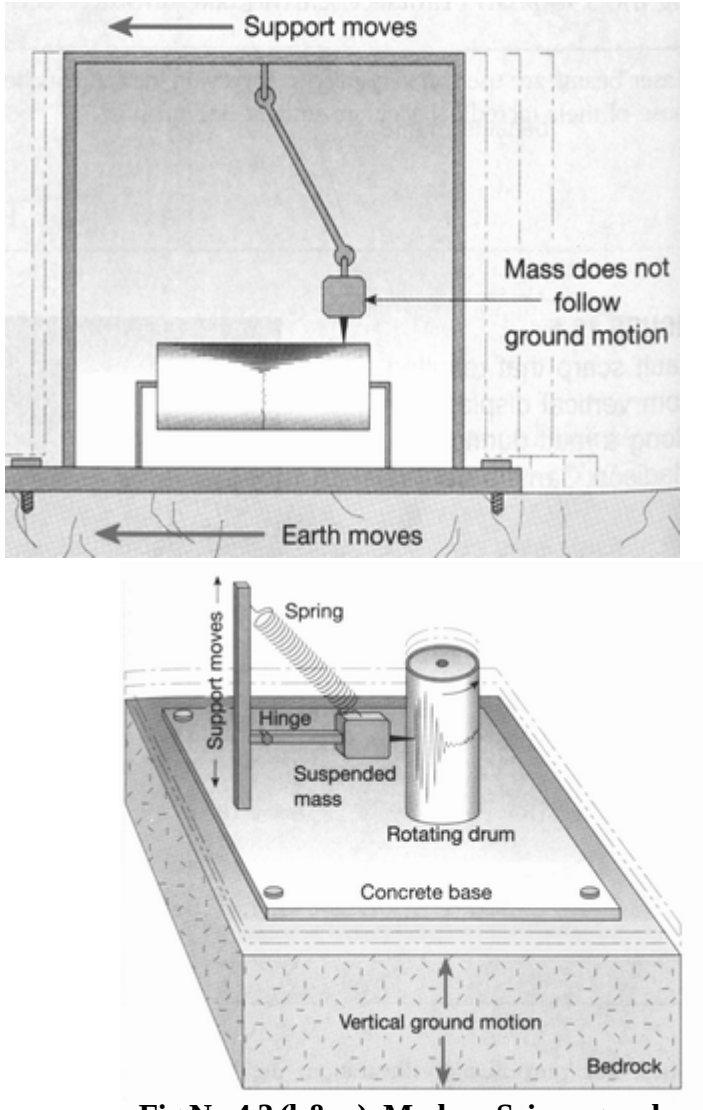


Fig.No.4.3 (b& c): Modern Seismograph

Richter Scale: Earthquakes are measured based on the power of the shock waves they create. These waves are called 'seismic waves' and they can be measured from far away. They are measured using something called the Richter scale. Each number you go up on the scale represents an earthquake that is ten times more powerful. So, an earthquake that measures 6.0 on the Richter scale is ten times more powerful than an earthquake that measures 5.0. Earthquakes that measure higher than 6.0 are considered dangerous. Because of their devastating potential, there is great interest in predicting the location and time of large earthquakes. Although a great deal is known about where earthquakes are likely to occur, there is currently no reliable way to predict the days or month when an event will occur in any specific location.

Did you know?

Richter scale

Richter Magnitudes	Earthquake Effects
<2.0	Generally not felt, but recorded
2.0-2.9	Potentially perceptible
3.0-3.9	Felt by some
4.0-4.9	Felt by most
5.0-5.9	Damaging shocks
6.0-6.9	Destructive in populous regions
7.0-7.9	Major earthquakes, inflict serious damage
≥8.0	Great earthquakes.Produce total destruction to communites near epicenter

The Japanese and Americans have invested heavily in computer technology to constantly monitor and analyse seismic activity. Every year over 150,000 earthquakes are recorded world wide. By comparing data about the same earthquake, gathered at different locations, it is possible to calculate the exact location, magnitude and depth of each event.

For example, the unique capabilities of a NASA earth-observing satellite have allowed researchers to view the effects of a major earthquake that occurred in 2001 in Northern India near the border of Pakistan. Considered one of the two most damaging seismic events in Indian recorded history, the Gujarat earthquake struck with a magnitude of 7.7 (Richter scale) on January 26, 2001. About 20,000 people died and another 16 million people were affected. The earthquake's epicenter was located about 80 kilometers east of the city of Bhuj, but the instrument kept in the satellite found release of water and sediment as far as 200 km from the epicenter. Additionally, there was significant dewatering all along an 80-100 kms wide (south to north) ancient salt lake bed to the north of Bhuj, known as the Rann of Kutch.

This image shows a sand blow deposit. When waves from a large earthquake pass through wet, loose sand, patches of sand erupt (from below the surface) onto the ground and form sand blow deposits.

The hope of many scientist is that we may someday be able to reduce the threat by understanding more about the internal structure of the earth. Such studies have shown that rock density increases from the

surface of the earth to its center. Knowledge of rock densities within the earth has helped scientists determine the composition of the earth's interior. Let us learn about the nature of the rocks and its composition in the following lessons.

Learning Outcomes

1. **Understood about the formation of earthquakes.**
2. **Understood that there is a causal relationship between the tectonic plates and the distribution of earthquakes.**
3. **Understood that accurate short term predictions are the goal of today's researchers.**

Points to Remember:

1. Earthquakes are a form of wave energy that is transferred through bedrock. It is transmitted from the point of the earthquake focus, as spherical seismic waves. They travel in all directions outward.
2. The point on the Earth's surface directly above the earthquake focus is termed the epicenter. Body waves and surface waves are two different types of seismicwaves. Body waves travel through the lithosphere. P-waves and S- waves are two kinds of body waves.
3. P-waves or primary waves are formed by the alternate expansion and contraction of bedrock. S waves or secondary waves are a second type of body wave. These waves are slower than P-waves and can only move through solid materials.
4. Surface waves travel at or near the Earth's surface. The velocity of these waves is slower than body waves. Despite their slow speed, these waves are particularly destructive to human construction because they cause considerable ground movement
5. Earthquakes are measured based on the power of the shock waves they create. These waves are called 'seismic waves' and they can be measured from far away.
6. Earthquakes are measured using something called the Richter scale. Earthquakes that measure higher than 6.0 are considered dangerous.
7. Seimometers work on a simple principle. A heavy weight suspended on a wire will remain steady as the vibrations pass, whilst the frame holding it will vibrate.

EXERCISES

I. Choose the correct answer:

1. The point on the Earth's surface directly above the earthquake focus is termed as
   a) the epicenter b) the core c) the centre
2. Body waves are seismic waves that travel through the
   a) hydrosphere b) lithosphere c) atmosphere
3. Molten rock rises, pushing two plates apart and adding new material at their edges is called
   a) Transform fault b) subduction zone c) Spreading zone

II. Fill in the blanks

1. Body waves and surface waves are two different types of ---------- waves.
2. S Waves are produced by ----------.
3. Seismic waves are measured in ---------- scale.
4. Primary waves are formed by the alternate ---------- and ---------- of bedrock.
5. S waves are ---------- than P-waves and can only move through ---------- materials

III. Match the following

1. January 26, 2001	P-waves
2. Earthquakes	Salt lake
3. Transform faults	Surface waves
4. Body waves	Gujarath earthquake
5. Rann of Kutch	wave energy
	sliding plates

IV. Answer briefly

1. What are seismic waves ?
2. What are earthquakes?
3. What is Richter scale?.
4. Write a brief note on bhuj earthquake.

V. Explain in detail

1. Illustrate and describe the tectonic plates and earthquakes.
2. Write an essay on "Detecting Earthquakes"

ACTIVITIES

1. Collect informations and pictures about the earthquakes and prepare an album

5.ROCKS

Learning Objectives

1. **Knows the causes behind the formation of rocks.**
2. **Understands the different types of rocks.**
3. **Learns about the uses of rocks.**

The Earth's building materials are the rocks. Rock is the hard, solid part of the earth. Beneath the Earth's solid crust are pockets of molten rock, called magma. Rock also lies beneath the oceans and under the polar icecaps. In many areas, the rock is covered by a layer of soil in which plants or trees may grow. Soil itself is made up of tiny bits of rocks usually mixed with organic materials from plants and animals. Coal, which is composed of plant material, is an example. Limestone contains the shells and skeletons of sea creatures and limy masses built by plants.

Rocks can be classified into three types based on their formation. They are: **1. Igneous 2. Sedimentary and 3. Metamorphic**

1. Igneous rocks: The word igneous comes from the Latin ignis, meaning "fire." Igneous rocks were never actually on fire, but they were formed from very hot molten material. Two types of igneous rocks are basalt and granite. Basalt is an extrusive rock, and granite is an intrusive rock. Basalt occurs on volcanic islands and makes up a large part of the oceanic crust, including mid-ocean ridges. Basalt is also found on continents. But the continents consist largely of granite. Today igneous rocks represent 95 per cent of the Earth's crust. Igneous rocks are classified into two groups: **extrusive and intrusive.**

Fig. No 5.1 Magma flow

a.Extrusive rocks: Extrusive igneous rocks are formed by magma that reaches the earth's surface along deep cracks and at volcanic vents. This magma that flows onto the surface is called lava. It forms broad flat sheets, or it builds up a volcanic mountain by repeatedly erupting from a vent (Fig.No.5.1). Most types of lavas cool rapidly, resulting in the formation of rocks composed mainly of microscopic crystals. Basalt is the most common extrusive igneous rock. Many volcanic islands, such as the Hawaiian Islands and Ice land, are composed of basalt.

b. Intrusive rocks: Some of the common types of intrusive rock (Fig.No.5.2) structures have a sheet-like shape, while others are quite massive. Also, observe some of these cut across existing structures, such as the sedimentary beds, where as others form when magma is injected bewteen sedimentary layers.

i. Dyke: Dykes are thin vertical veins of igneous rock that form in the fractures found within the crust. Because these intrusive features cool quickly their rocks are dominated with fine mineral grains. The largest dykes have lengths of hundreds of kilometers. Most dykes, however, are a few meters thick and extend laterally for not more than a few kilometers.

ii. Sill: Sill is horizontal planes of solidified magma that run parallel to the sedimentary bedding surface. Horizontal sills are the most common though vertical are known to exist.

iii. Laccoliths: Laccoliths are similar to sills because they form when magma is intruded between sedimentary layers. A laccolith has a dome shape structure and not much wider than a few kilometers.

iv. Batholith: By far the largest intrusive igneous rock is the batholiths. The largest batholoiths are linear structures several kilometer long and nearly one hundred kilometers wide.

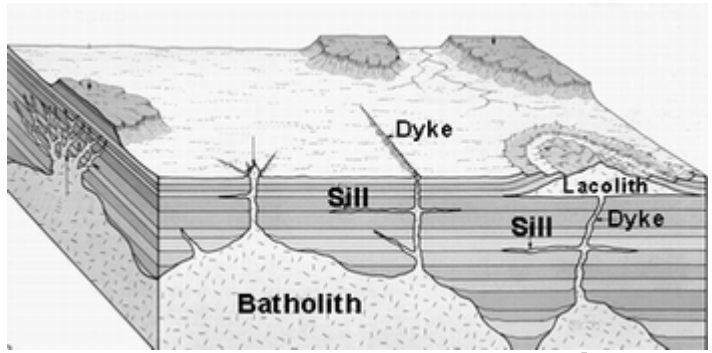


Fig.No. 5.2 Intrusive rocks

v. Volcanic Pipe: If a dyke reaches the surface of the Earth it is then called a volcanic pipe. Igneous deposits produced by this feature are extrusive in nature.

2. Sedimentary rocks: Rocks do not remain the same forever. They are broken down every day by wind, temperature changes, water, and ice. Large blocks of rock fall from cliffs. Eventually they break up into pebbles, sand, and mud. They are washed into the rivers, and the rivers spread them along their banks and deposit them at their mouths in lakes and the sea.

When these materials come to rest they are known as sediment, meaning “matter that settles.” At first sediments are soft and loose. As layer settles upon layer, the overlying weight squeezes the material close together. Meanwhile dissolved mineral matter settles around the grains of the sediments and cements them together. The solid mass is then a sedimentary rock.

One of the commonest sedimentary rock is sandstone. It consists of cemented sand . Shale is cemented mud, silt, or clay. Conglomerate is a coarse rock made up of pebbles and even boulders. Limestone is a

rock made up of the shells and skeletal materials of lime-secreting plants and animals. Coal is a sedimentary rock of plant origin.

Sedimentary rocks can be recognized by two features. First, they are made up of materials that once were a part of older formations, such as the igneous rocks. Second, because of the sorting action of the water in which they were laid down, they lie in layers, called strata. So it is said that sedimentary rocks are stratified.

Though sedimentary rocks represent less than 5 per cent of the Earth's crust but 75 per cent of the Earth's land surface is composed of sedimentary rocks.

3. Metamorphic rocks: The third group of rocks is the metamorphic. The term comes from a Greek word meaning "change of form." Metamorphic rocks can be formed from both igneous and sedimentary rocks.

The forces that produce them are:

(1) pressure and heat resulting from the shrinking and folding of the Earth's crust;
(2) water action, which dissolves and redeposits minerals; and
(3) the action of hot magma on old rocks.

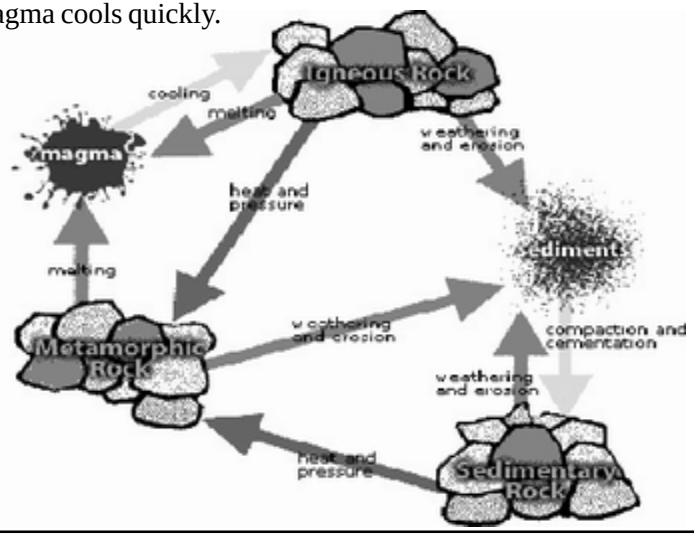
Probably the most common metamorphic rock is gneiss. It was originally granite. Due to Shrinking and pressure the minerals are in distinct layers. Pressure changed bituminous (soft) coal into anthracite (hard coal). Some marble was formed by the folding and pressure on limestone. Other marble was made when water seeped through deeply buried limestone, the water dissolves the limy mineral and rearrange the particles in little crystalline blocks.

Water also changed many sandstones by depositing quartz around the grains of sand. In time each grain become a crystal, locked to other crystals. Thus the sandstone became quartzite. Thus the rocks

of the Earth's crust are constantly being created, worn down and redeposited slowly in a rock cycle.

Did you know?

The Rock Cycle is a group of changes. Igneous rock can change into sedimentary rock or into metamorphic rock. Sedimentary rock can change into metamorphic rock or into igneous rock. Metamorphic rock can change into igneous or sedimentary rock. Igneous rock forms when magma cools and makes crystals. Magma is a hot liquid made of melted minerals. The minerals can form crystals when they cool. Igneous rock can form underground, where the magma cools slowly. Or, igneous rock can form above ground, where the magma cools quickly.



Rocks and uses: Rocks and minerals are useful in a number of ways. Builders use granite, marble, and other rocks in construction work. Cement made from limestone and other rocks serves to bind crushed stone into strong, long-lasting concrete for buildings, dams, and highways.

Metals such as aluminum, iron, lead, and tin come from rocks called ores. Ores also supply such radioactive elements as radium and

uranium. Ore deposits may lie close to the earth's surface, or deep underground. In some regions, deposits of iron or copper ores make up entire mountains.

Some rocks contain valuable nonmetallic minerals such as borax and graphite. All gems, except amber, coral, and pearl, come from rocks. Diamonds mined in Africa and Arkansas come from a rock called peridotite. Emeralds are found in black limestone in Colombia.

Geologists trace the history of the earth by studying rocks. They find oil deposits by studying the structure, age, and composition of rock layers. Other scientists study fossils (remains of plants and animals found in rock) to learn about the kind of life that existed millions of years ago .

Thousands of young people and adults enjoy collecting rocks and minerals as a hobby. The hobbyists call themselves "rock hounds." They trade rocks and minerals just as stamp collectors trade stamps. A collector in Los Angeles may trade with fellow hobbyists in his or her local rock and mineral club, or with other collectors as far away as New York City, Montreal, or Vienna. There are about a thousand rock and mineral clubs in the United States and Canada. These clubs hold regular meetings, sponsor study groups and exhibits, and organize field trips to collecting areas. Sometimes the clubs help develop collections for local museums.

Collecting rocks and minerals is a popular and worthwhile hobby. It combines outdoor exercise with indoor study. Learning to identify the minerals and fossils in rocks may lead to a career in such rewarding sciences as chemistry, physics, geology, physical geography. Rocks and minerals can be picked up almost anywhere near quarries and mines, road cuts, building excavations, beaches and streambeds.

The removal of rock and soil by natural processes is known as Erosion. The surface of the earth is constantly being sculptured into

new forms by various erosional agents. Among them river is the most powerful agent of erosion. Let us continue to learn about the rivers and its activities in the following lessons.

Learning Outcomes

1. **Understood about how rocks are formed.**
2. **Understood that there are three types of rocks.**
3. **Understood that geologists trace the history of the earth by studying rocks**

Points to Remember:

1. The word igneous comes from the Latin ignis, meaning fire. Igneous rocks were never actually on fire, but they were formed from very hot molten material. Igneous rocks were the first rocks.
2. Igneous rocks are classified into e xtrusive and intrusive rocks. Extrusive rocks form when magma flows onto the surface of the earth or floor of the ocean and then cools and hardens. Intrusive rocks result when magma solidifies beneath the earth's surface.
3. Dykes are thin vertical veins of igneous rock that form in the fractures found within the crust.
4. Sill is horizontal planes of solidified magma that run parallel to the grain of the original rock deposit. Batholith is a large plutonic masses of intrusive rock with more than 100 square kilometers of surface area. If a dyke reaches the surface of the Earth it is then called a volcanic pipe. This feature is extrusive in nature.
5. The soft and loose sediments settles as layer upon layer, the overlying weight squeezes the material close together and cements them together. The solid mass is then a sedimentary rock.
6. The term metamorphic comes from a Greek word meaning change of form. Metamorphic rocks can be formed from both igneous and sedimentary rocks.

EXERCISES

I. Choose the correct answer:

1. When magma flows onto the surface of the earth or floor of the ocean the type of rock that form is called as
   a) Extrusive b) Intrusive c) Igneous
2. The thin vertical veins of igneous rock that form in the fractures is
   a) Batholith b) Sill c) Dykes
3. The term metamorphic comes from
   a) a Greek word b) a Latin word c) an English word

II. Fill in the blanks

1. The word ---------- comes from the Latin ignis, meaning fire.
2. The most common extrusive rock is called ----------
3. One of the most common sedimentary rock is ----------.
4. Coal is a ---------- rock of plant origin.

III. Match the following

1.	Limestone	P-waves
2.	Emeralds	Granite
3.	Strata	Canada
4.	Gneiss	Columbia
5.	Rock club	cement
		sedimentary

IV. Answer briefly

1. What are dykes?
2. How sedimentary rocks are formed?
3. Describe a volcanic pipe.
4. Write a brief note on extrusive rocks
5. Give an account of rock hounds.

V. Explain in detail

1. Expalin in detail about the formation of intrusive rocks.
2. Describe the metomorphic rock.
3. Collecting rocks and minerals as a hobby - comment

ACTIVITIES

1. Collect rock samples from your neibourhood and built a rock museum in your class room under the guidence of your teacher.

6. RIVERS

Learning Objectives

1. **Knows that the streams are the most important agent of erosion.**
2. **Learns about the features along the course of a river.**

Of all the geological processes, rivers may have the greatest impact on people. We depend upon rivers for drinking , irrigation, electricity travel etc. Fertile floodplains of the rivers have fostered human progress since the dawn of civilization. As the dominant agent of landscape alteration, rivers have shaped much of our physical environment.

A river starts as a tiny trickle, or rill, on a slope. Rainfall, snowfall, a spring, or the melting of glacial ice may be its source. As it flows downhill it is joined by other trickles to make a brook. Several brooks add their waters to form a stream, which broadens into a creek. As

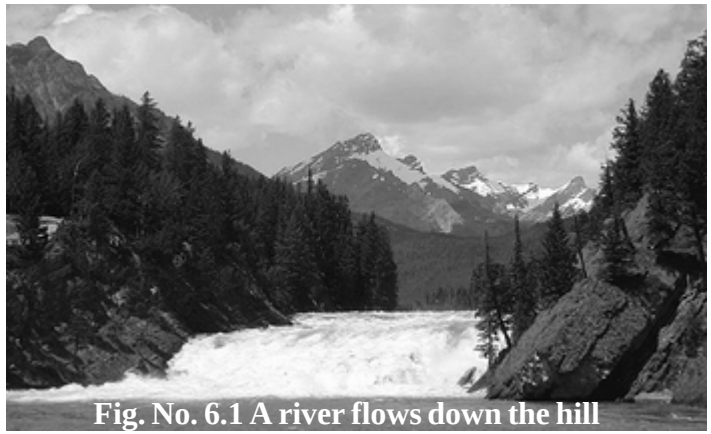


Fig. No. 6.1 A river flows down the hill

the water continues its downward journey, it gains in volume and finally becomes a river (Fig.No.6.1).

A river does three different kinds of work. They are:

1. Erosion, 2. Transportation and 3. Deposition

1. Erosion: Rivers erode their channels in several different ways: a.by lifting loosely consolidated particles, b.by abrasion, and c.by solution activity. The last of these is by far the least significant. Although some erosion results from the solution of soluble bed rock and channel debris, most of the dissolved material in a river is contributed by the groundwater.

a. By lifting: When the flow of water in the river is turbulent, the water whirls and eddies. When an eddy is suffeciently strong, it can dislodge rock pieces and lift them into the moving water. In this manner the force of running water swiftly erodes lossely consolidated materials on the bed and banks of the river. Stronger the current, more effectively the stream will lift the rock pieces. In some instances water is forced into cracks and bedding planes with sufficient strength and moves pieces of rock from the bed and banks of the channel.

b. By abrasion: Observing a muddy river will reveal that currents of water can lift and carry debries. However, it is not obvious that a river is capable of eroding solid rock. Nevertheless, the solid particles carried by a river are capable of abrading a bedrock channel. The ceaseless bombardment of these rock pieces against the bed and banks of the river channel have created many steep sided gorges cut through solid rock. In addtion, the individual rock pieces are also abraded by the many impacts with the channel and with one another. Thus, the rock pieces by scraping, rubbing and bumping, erodes bedrock channel and the banks. Simultaneously these rock pieces also get reduced in their size and smoothend to form pebbles. This process of erosion is known as abrasion.

Abrading tools such as pebbles and sand particles that are swirling in fast-moving eddies, act as drill to bore holes on the river beds. In

course of time, the rotational motion of pebbles and sand particles create rounded depressions several meter across and just as deep. Such large depressions (Fig.No.6.2) are known as potholes. As the abrading particles wear down to nothing, they are replaced by new ones that continue to drill the river bed.

Fig. No. 6.2 Potholes

2. Transportation: The solid material carried by a river is called its load. A river transports its load in three different ways. They are: a. in solution (dissolved load) b. in suspension (suspended load) and c. by saltation (bed load).

a. In solution: Some of the material a river carries in solution, is acquired when running water dissolves bedrock channel. However, the greatest portion of the dissolved load transported by most rivers is supplied by groundwater. As water percolates through the ground, it first acquires soluable soil compounds. As the water seeps deeper through cracks and pores in the bedrock below, additional mineral matter is dissolved. Eventually much of mineral-rich water finds its way into rivers. The velocity of river flow, which is very important to the transportation of solid particles, has essentially no effect upon a river's ability to carry its dissolved load. After material is in solution, it goes wherever the stream goes, regardless of velocity.

b. In Suspension: The major portion of the river load is carried in suspension. Usually only fine sand, silt and clay-sized particles can be carried this way, but during floods larger particles are carried in suspension as well. The finest materials such as silt and clay remain suspended in the water for most of their journey and sink very slowly.

3.By saltation: A portion of a river's bedload consists of solid rock fragments. They are too large to transport in suspension. So they are moved along the bottom by saltation, rolling, and sliding. Particles moving by saltation appears to jump or skip along the river bed. This occurs as particles are propelled upward by collisions or sucked upward by the current and then carried down stream a short distance until gravity pulls them back to the bed of the river. Particles that are too large or heavy to move by saltation, either rolled or pushed along the bottom,depending upon their size and shape.

Unlike the suspended and dissolved loads, which are constantly in motion, the bed load is in motion only intermittently. The movement of bedload is determined by two factors. They are: a. the competence and b. the capcity of the river .

a. The Competence of the river: Competence is a measure of the maximum size of particles the river is capable of transporting. The river's velocity determines its competence; the stronger the flow, the larger the particles it can carry in suspension or as bed load. It is a general rule that the competence of a river increases as the square of its velocity. Thus, if the velocity of a stream doubles, the impact force of the water increases four times; If the velocity triples, the force increases nine times, and so forth.

b. The capacity of the river: The maximum load of solid particles that a river can transport is termed its capacity. The capacity of a river is related to its discharge. The greater the amount of water flowing in a river, the greater the river's capacity for hauling sediments.

Hence, the large boulders that are often visible during a low-water stage and seem immovable, can be transported during floodstage because of stream's increased velocity. With rising velocity the water becomes more turbulent, and larger and larger particles are moved by the river. In course of just a few days, or perhaps just a few hours, a

stream in floodstage can erode and transport more sediments than it does during months of normal flow.

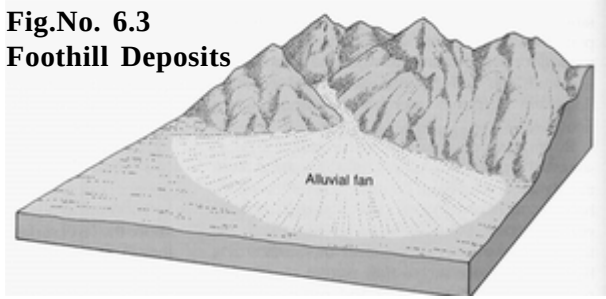
3. Deposition:

Whenever a river's velocity subsides, its competence is reduced. As the velocity of a river diminishes, particles of sediment are deposited according to size. As the river flow drops below the criticle settling velocity of a certain particle size, sediment in that category begins to settle. Thus river transport provides a mechanism by which solid particles of various sizes are seperated. This process, called sorting, explains why particles of similar size are deposited together.

The well sorted material typically deposited by a river is called alluvium. Many different depositional features are composed of alluvium. Alluvium deposits are found in three places. They are: **a.Foothill deposits b. River bed deposits and c.Plain deposits**

a. Foothill deposits: When a river leaves a narrow valley in the mountainous terrain and comes out suddenly on to a broad, flat plain such as a plateau, or a valley floor , the velocity of the river is reduced. So, the river deposits its load in response to the abrupt drop in gradient,

Fig.No. 6.3
Foothill Deposits



combined with the change from a narrow channel of a mountainous stream to the unconfined flow on the slopes of the plain. The sudden drop in velocity causes the river to dump its load of sediments quickly in a distinctive cone-or-fan-shaped accumulation at the foot hills. This accumulation is called foothill deposit or alluvial fans (Fig.No.6.3).

The surface of the alluvial fan slopes outward in a broad arc from an apex at the mouth of the steep valley. Usually, coarse material is dropped near the apex of the fan, while finer material is carried toward the base of the deposit. One can see such alluvial fans in the Kambam valley of Madurai district.

2. River-bed deposits: In a river, volume of water flowing into is highly variable. During rainy season, the volume of water in a river is very high. In contrast, during dry season the volume of water in the same river is very low or completly dry. (Fig.No.6.4). When the volume of water in a river reduces, its velocity and the capcity to transport the coarser materials also reduces. The river deposits some of its materials on its bed. Such deposits are known as 'river bed deposits'. River bed deposits are often composed of sand and gravel, the coarser components of a river's load and are commonly referred to as bars. Such features, however, are only temporary, for, the material will be picked up again by the running water and be transported farther down stream.

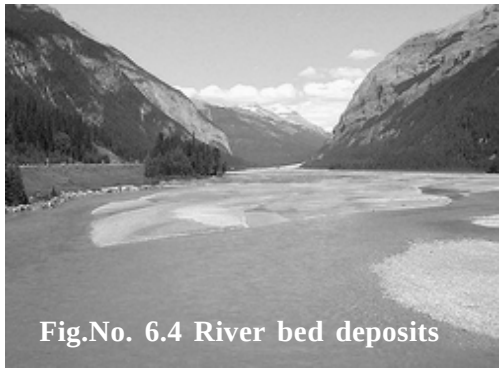


Fig.No. 6.4 River bed deposits

3. Plain deposits: Before entering into plain, the river deposits all the larger particles and other smaller particles on the river bed at the foot hill . Only very fine particles are transported into the plain region. As the slope of the plain is very gentle, the velocity of the river is very much reduced. The forward motion of the river is very much arrested at the place where it enters the sea. As a result, finer particles are deposited near the mouth of the river. Such deposits are called as 'plain deposits'. One form of plain deposits is known as Delta.

Did you know?

Many large rivers have deltas that extend over thousands of squre kilometers. The delta of the Mississippi river is one such feature. It resulted from the accumulation of huge quantities of sediment derived from the vast region drained by the river and its tributaries. During the past 5000-6000 years, the mississipi river has built a series of seven subdeltas. The numbers in the figure indicate the order in which the subdeltas were deposited. The present bird foot delta (number7) represents the activity of the past 500 years.

Course of a river and its associated features: Nearly all rivers have an upper, middle, and lower course. Each level has its own characteristics.

The Upper Course: The upper course begins at higher elevations. Here the river is smaller and usually has a rapid, tumbling flow that cuts a narrow channel through rocky hills or mountains. Over thousands or millions of years the river erodes, or wears away, soil and rocks and carves a canyon or a deep, V-shaped valley. The type of formation it creates depends on the force of the river and the type of material it erodes.

V-shaped valley: A deep, steep-walled, V-shaped valley (Fig.No.6.5) cut by a river through resistant rock is often called a canyon, from the Spanish word *canon*, meaning "tube." Such valleys often occur in the upper courses of rivers, where the stream has a strong, swift current that digs its valley relatively rapidly. Smaller valleys of similar appearance are called gorges .

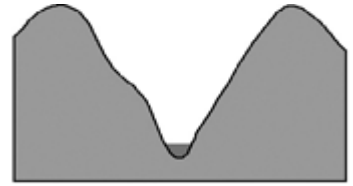


Fig.No. 6.5 V shaped valley

The largest and most famous canyons have been cut through arid or semiarid lands by swift streams fed by rain or melting snow of moister regions. The walls remain steep and angular because they are not worn and softened by frequent rainfall and surface drainage.

The middle course: When the river descends to lower elevations, it runs more slowly over the gently sloping land of its middle course.Its current no longer has the force to carry stones or gravel. This material drops to the riverbed, where it forms bars of sand or gravel or builds islands. These formations are continually changing shape as the river deposits or erodes material. The formations affect the river in turn by altering its course. River currents swing toward one bank or the other, gradually undercutting the banks and widening a V-shaped valley into a U shape.

As the river flows downstream it reaches the still gentler slope of its lower course. It drops more of its load than it did upstream and begins to build up its bed instead of tearing it down. The valley has been eroded into a wide plain. The river swings in great S-shaped curves, forming loops called meanders (Fig.No. 6.6).

Did you know?

The Grand Canyon, one of the most majestic natural wonders in the world, is nature's handiwork. Nature's greatest example of sculpture, the Grand Canyon in northern Arizona is the most spectacular canyon in the world. It is a 446-kilometer long gorge cut through high plateaus by the Colorado River. It is noted for its fantastic shapes and colors. Within the walls of the canyon stand imposing peaks, canyons, and ravines. In general, the color of the canyon is red, but each stratum or group of strata has a distinctive colour such as gray, delicate green or pink, and, in its depths, brown, gray, or violet. No other place on Earth compares with the kilometer-deep Grand Canyon for its record of geological events. Some of the canyon's rocks date back about 4 billion years. The river's speed and such "cutting tools" as sand, gravel, and mud account for its incredible cutting capacity.

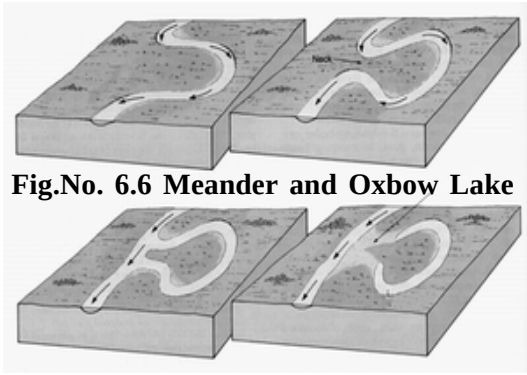


Fig.No. 6.6 Meander and Oxbow Lake

Oxbow lakes: Meandering channels form where streams are flowing over a relatively flat landscape with a broad floodplain. When a river floods, it may cut across the narrow part of the loop, making a new, shorter channel. The loop is left as a lake known as an oxbow lake.

The lower course: At times heavy rain or melting snow rushes from the upper or middle course of a river into the shallow channel of the lower course. The river floods the surrounding country, leaving a

thin layer of sediment. If the flooding is seasonal, in time the layers of sediment accumulate and build a broad, fertile floodplain.

Flood Plain: As its name implies, a floodplain (Fig.No.6.7) is that part of a valley that is inundated during a flood. Most rivers are bordered by floodplains. Although some are impressive features that are many kilometers across, others are very modest, having widths of just a few meters.

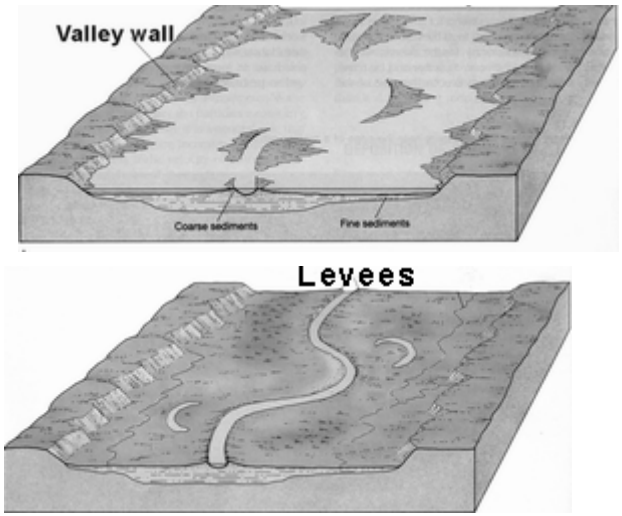


Fig.No.6.7 Flood Plain & Natrural Levees

Levees : Rivers that occupy valleys with broad, flat floors sometime create a landform called a natural levee that parallels the stream channel. Natural levees are built by successive floods over a period of many years. Levees are ridges found along the sides of the stream channel composed of sand or gravel. Levees are approximately one half to four times the channel width in diameter. The area behind the levee is characteristically poorly drained for the obvious reason that water cannot flow up the levee and into the river. Marshes called back swamps often result.

Upon retreat of the flood waters, stream velocity is reduced causing the deposition of alluvium. Repeated flood cycles over time can result in the deposition of many successive layers of alluvial material.

The well-sorted materials typically deposited by the stream is called alluvium, a general term applicable to any river-deposited sediments. Some of these features may be found within river channels, some occur on the valley floor adjacent to the channel, and some exist at the mouth of river.

So far we have learnt about how a river works and the different features found along the course of a river. Now Let us take river Cauvery that run accross Tamilnadu as an example and try to understand the different course of a river.

River Cauvery is the only major river in Tamilnadu. This is an inter-state river with many tributaries lying in Karnataka and Tamilnadu States. It has a catchment area of 80,290 Sq.kms., of which around 44,000 Sq.kms., is in Taminadu.

Upper course of river cauvery: River Cauvery originates from Coorg in Karnataka and it flows through the deep valleys of the mountain. The river cauvery is so narrow at its origin that a sheep could jump across it easily. The important tributaries that join the river Cauvery are the Hemavathi, the Lakshmanatheertha, and the Kabini. After crossing the mountainous region, cauvery river flows through Deccan plateau. The river enters Tamilnadu state at Hogenekal falls, in Dharmapuri district.

Middle course of river Cauvery: The tributaries such as Bhavani, Amaravathi, and Noyyal join the river cauvery while flowing through the Deccan plateau. As the volume in the cauvery increases, its bank becomes wider. Hence, The cauvery that flows in Tamilnadu is known as Aganda (wide) Cauvery.

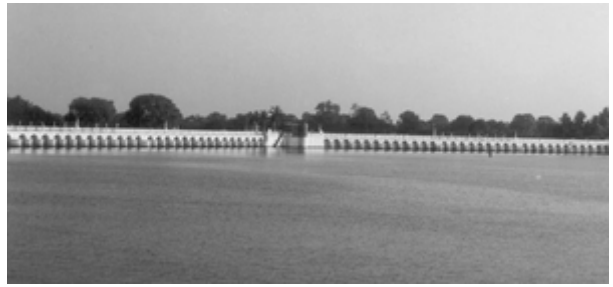
Map.No. 6.1 River Basins of TamilNadu

Lower course of river cauvery: The Aganda cauvery enters the the plain, and branches off into northern and southern branch near Thiruchirapalli district. The Coleroon, the northern branch is really the main distributary of the river and carries the bulk of floodwater to the

sea. It flows in an eastern direction and before entering into sea forms a delta, little south of Portonova town. The southern branch, retains the name cauvery and branches off into Vennaru, Vettaru and Vadavaru. Eventually, before entering into sea at Kaveripattinam about 12 kms., north of Tranquebar forms a delta.

Did you know?

By far the most important irrigation structure that was built some time in the second century AD by the king Karikala Chola is the Grand Anicut across river Cauvery 16 km east of the Tiruchirapalli town. The Grand Anicut is a marvelous piece of hydraulic structure, built across the mighty river in its sandy bed, when the science had not developed enough to build safe structures on permeable foundations.



River Cauvery has been and is the lifeline of the state of Tamilnadu. The delta gets its supplies from river Cauvery through the regulators located in Grand Anicut. At Grant Anicut, there are arrangements by which the surplus waters in Cauvery can be diverted into Coleroon. The Grand Anicut can therefore be considered as the head of the delta where the waters are regulated and allowed in Cauvery river, Vennar river, Grand Anicut canal and Coleroon in measured quantities. The main function of this anicut is to retain the water in Cauvery and its branches in the delta by raising water level and pass on the surplus into Coleroon arm just a kilometre off to the north through Ullar river. The whole work might have been done employing native labour with a religious zeal utilizing whatever experience they had at that time in tackling river problems.

Geologically, groundwater is also an important erosional agent. Besides groundwater is an important source for domestic use , irrigation and industrial use. In addtion, groundwater contamination due to human activities is a real and growing threat in many places. Let us investigate all these aspects in the follwing lesson.

Learning Outcomes

Pupil

1. **Understood the ability of a stream to erode, transport, and deposit materials.**
2. **Understood that all rivers have an upper, middle, and lower course.**
3. **Understood the course of river cauvery.**

Points to remember:

1. The rotational motion of the sand and pebbles act as a drill to bore the holes. These smooth depressions are known as potholes.
2. A deep, steep-walled, V-shaped valley cut by a river through resistant rock is often called a canyon. Smaller valleys of similar appearance are called gorges .
3. The valley has been eroded into a wide plain . In such a the river swings in great S-shaped curves, forming loops called meanders.
4. When a river floods, it may cut across the narrow part of the loop, making a new, shorter channel. The loop is left as a lake known as an oxbow lake.
5. The materials that are deposited on the river bed is called river bed deposits. The materials that are deposited at the foot hills is known as foot hill deposits. The finest particles that are deposited on the plains, near the mouth of the river are called as plain deposits.
6. Alluvial fans develop when streams carrying a heavy load reduce their velocity as they emerge from mountainous terrain to a nearly horizontal plain.
7. The forward motion of the river is checked upon when a river enters an ocean. So, the river deposits its load of sediments near the mouth of the river. This is known as Delta.

EXERCISES

I. Choose the correct answer:

1. Potholes are the product of
   a) Corrosion b) solution c) suspension
2. The river that swings in great S-shaped curves, forming loops are called
   a) meanders b) oxbow lakes c) levees
3. A deep, steep-walled, V-shaped valley cut by a river through resistant rock is often called a
   a) Depression b) lakes c) canyon.

II. Fill in the blanks

1. When rivers erode their channel by lifting lossely consolidated particles by ---------- is called mechanical erosion.
2. The major portion of the river load is carried in ----------.
3. A deep, steep-walled, V-shaped valley cut by a river through resistant rock is often called a ----------.
4. The particles composing the ---------- is moved along the bottom by rolling, sliding and saltation.
5. The finest particles that are deposited on the plains, near the mouth of the river are called ---------- deposits.

III. Match the following

1. Loops	Tamilnadu
2. Canyon	Alluviam
3. Cauvery	near the river mouth
4. Delta	Dharmapuri
5. Hogenakal	V shaped valley
	Meander

IV. Answer briefly

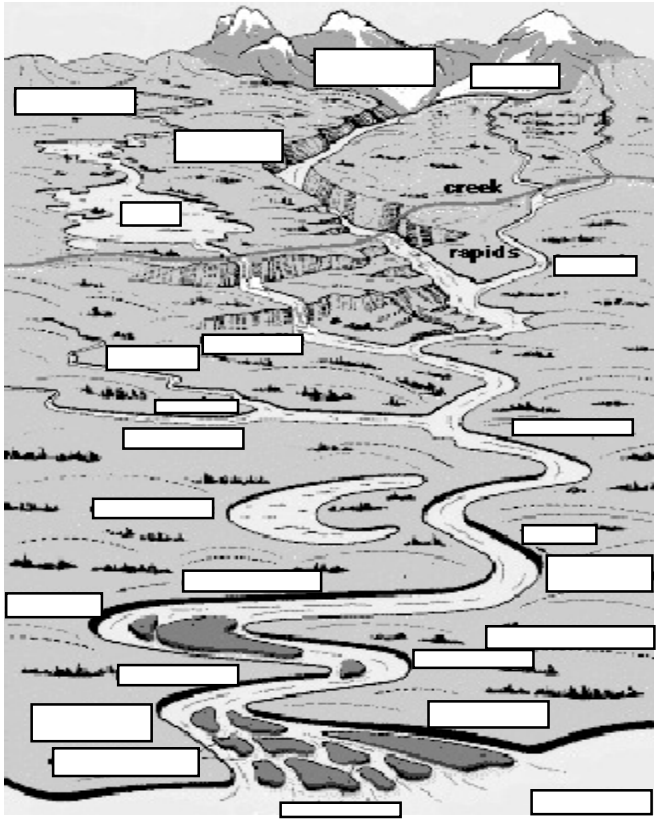
1. How do rivers form?
2. Describe briefly about potholes?
3. Write a note on V shaped valley.
4. What are oxbow lakes.
5. Differentiate chemical and mechanical erosion?

V. Explain in detail

1. Expalin indetail about the ways in which the rivers transport their eroded channels.
2. Write an essay on “Course of a river and its associated features”.
3. Describe in your own words about a river that flows in your neibourhood.

ACTIVITIES

1. Construct a model of a river that flows in your neibourhood and describe the different features created by the river along its course. Illustrate like the one shown below.



7. UNDERGROUND WATER

Learning Objectives

1. **Knows that groundwater is important sources of water.**
2. **Learns about the watertable.**
3. **Understands the groundwater groundwater.**

When rain falls on the landmass, some of the water runs off as streams and rivers, some evaporates, and the remaining water percolates into the ground. This groundwater provides water for domestic needs, for irrigating crops, and for industrial use. In some areas, however, overuse of this basic resource has resulted in depletion, land subsidence, saltwater intrusion, and increased pumping cost.

The amount of water that penetrates into the ground is controlled by several factors. They are: a.steepness of slope, b.nature of surface material, c.intensity and duration of rainfall, and d. type and amount of vegetation.

Heavy rain, falling upon steep slopes underlained by hard materials that prevents percolation, will obviously result in a high percentage of runoff. On the otherhand, if rain fall slowly, steadily and upon gentle slopes composed of permiable materials that could be easily penetrated, results in high percentage of percolation. Hence, the percolation and amount of groundwater that is stored depends upon the nature of the subsurface materials and quantity and duration of rainfall.

Nature of subsurface materials: The surface water seeps into the ground because the bedrock, sediments, and soil contain voids or

openings. These openings are similar to those of a sponge and are often called **pore spaces.** The quantity of groundwater that can be stored depends on the number of pore spaces present in the material. The rock that consists of such pore spaces are called porus rock.

Porosity: The ratio between volume of pores to the total volume of rock is known as **porosity.** Let us understand this with an example. Clay have 50% porosity, whereas gravels have 20 percent porocity. In the case of clay, the ratio between pore spaces to the total volume is 0; that means the pore spaces occupy 50 percent and soild particles occupy the remaing 50 percent. Where as in gravel, the ratio betwen the pore spaces to the total volume is 20:80; that means the pore

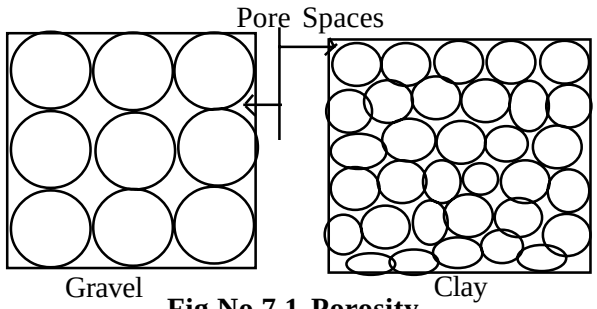


Fig.No.7.1 Porosity

spaces occupy 20 percent and soild particles occupy the remaing 80 percent. So, sediments such as clay has high porosity where as sediments such as gravel has low porosity. Where sediments of various sizes are mixed, the porosity is reduced because the finer particles tend to fill the openings between the larger grains (Fig.No.7.1).

Most of the igneous and metomorphic rocks, as well as some sedimentary rocks have very low porosity. It is mainly because, they do not have much pore spaces. They become porus, only when there are cracks and fissures in these rocks.

Permiability: Groundwater moves by twisting and turning through the pore spaces that are present in a rock or sediment. A rock or

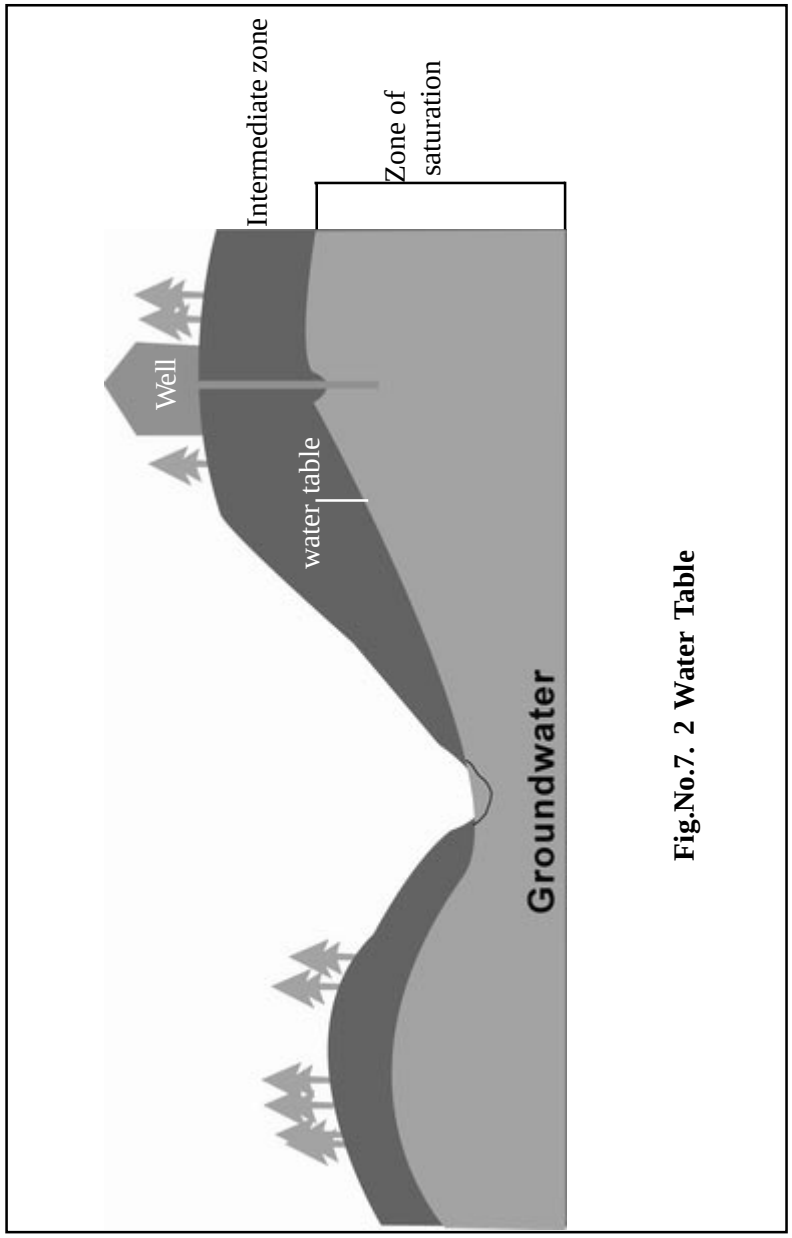


Fig.No.7. 2 Water Table

sediment should have the ability to transmit the water through its pore spaces. The smaller the pore spaces, the slower the water moves. The ability or capcity of a rock or sediment that allow the water to perculate through its pore spaces is known as permiability.

Although porosity of clay is high, its pore spaces are so small that water is not allowed to percolate, whereas porosity of gravel is very low but water is allowed to perculate into the ground. Hence, clayey soils are non permiable and latetrite soils are permiable in nature.

Permeable rock strata or sediments such as sand or gravel that transmit groundwater freely are called aquifers. Impermiable layers composed of materials such as clay that hinders or prevents water movement are termed aquicludes.

So, porosity is not always a reliable guide to the amount of ground water that can be produced. The significant factor in determining the availability groundwater is the permiability.

Water Table: When rain falls on the surface, the soil retains a portion of it as moiture. The soil moiture is used as a source of water by plants. When the soil is saturated, the excess water penetrates downward until it reaches a zone, where pore spaces in sediment and rock are compeltly filled with water. This belt is called Saturation Zone. The water held in this zone is called groundwater. The upper limit of groundwater zone is known as the watertable. Extending upward from the watertable is the intermediate zone (Fig.No.7.2).

Although we cannot observe the watertable directly, its position can be mapped and studied in detail in areas where wells are numerous. The water level in wells coincides with the watertable of the groundwater. Such maps reveal that the level of water table fluctuates and changes now and then. A number of factors contribute to the fluctuations in the water table. For example, variations in rainfall and varition in permeability lead to uneven infiltration and thus to differences

in water table level. The water table level may fluctuate considerably during the course of a year, dropping during dry seasons, and rising following periods of rain.

Erosional work of Groundwater:

The primary erosional work carried out by groundwater is that of dissolving rock. Groundwater carries on , its rather unique and important role as an erosional agent in soluable rocks, especially in limestone regions. Although nearly insoluable in pure water, limestone is quiet easily dissolved in water containing carbon dioxide. Rainwater dissolves carbon dioxide from the air and decaying plants and becomes diluted carbomic acid. This infiltrates as groundwater and whenever groundwater comes in contact with limestone, the carbonic acid reacts with the calcite in the rocks to form calcium bicarbonate. It is a soluable material that is carried away in solution.

Caverns: Among the most spectacular results of groundwater's erosional handiwork is the creation of limestone Caverns. Although most are relatively small, some have spectacualar dimensions. For example the Mammoth cave in Kentucky, USA is very famous cavern. It is the most extensive in the world, with more than 5 interconnected passages.

Fig.No.7.3
A Dripstone

Most caverns are created at or just below the water table in the zone of saturation. Here the groundwater follows the lines of weakness in the rock, such as joints and bedding planes. As time passes, the dissolving process slowly creates cavities and gradually enlarges them into caverns. The material that is dissolved by the groundwater is carried away and discharged into rivers.

The spectacular features that arouse the greatest curiosity for most cavern visitors are the stone formations and give some caverns a wonderland appearance. These features are created by the seemingly

endless dripping of water over great span of time. These cave deposits, however, are also commonly called dripstones (Fig.No.7.3).

Perhaps the most familiar dripstones are stalactities (Fig.No.7.4). These icicle-like pendents hang from the ceiling of the cavern and form where water seeps through cracks above. When the water come in contact with air in the cave, some of the dissolved carbon dioxide escapes from the drop and calcite begins to precipitate. Deposition occurs as a ring around the edge of the water drop. As drop after

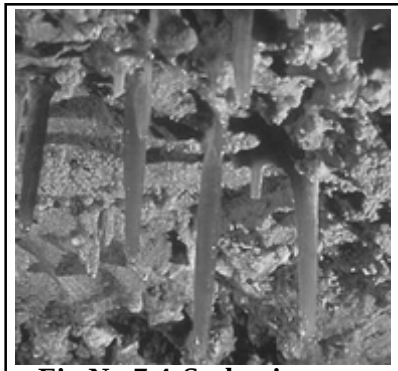


Fig.No.7.4 Stalactites

Fig.No.7.5 Stalagmites

drop follows, each leaves an infinitesimal trace of calcite behind, and a hollow limestone tube is created. Water then moves through the tube, remains suspended momentarily at the end, contributes a tiny ring of calcite, and falls to the cavern floor. The stalactite just described is appropriately called a Soda straw. Often the hollow tube of the soda straw becomes plugged or its supply of water increases. In either case, the water is forced to flow, and hence deposit takes place along the outside of the tube. As deposition continues, the stalactite takes on the more common conical shape.

The dripstones that form on the floor of a cavern and reach upward toward the ceiling are called stalagmites (Fig.No.7.5). The water supplying the calcite for stalagmite growth falls from the ceiling and splatters over the surface. As a result, stalagmites do not have a central

tube and are usually more massive in appearence and rounded on their upper ends. Various dripstone features such as stalactite and stalgmites found in caverns are collectively called speleotherms.

Karst Topography: Some areas in the world, to a large extent, have been shaped by the dissolving power of groundwater. Such areas are said to exhibit karst topography. This term is derived from a plateau region located along the northeastern shore of the Adriatic Sea in the part of Yugoslavia called Slovenia where such topography is strikingly developed. The most common geologic setting for karst development is an area where limestone is present near the surface beneath a layer of soil. Karst areas characteristically exhibit an irregular terrain punctuated with many depressions, called sinkholes or sinks.

Sinkholes: Sinkholes commonly form in one or two ways. Some develop gradually over many years without any physical disturbance to the rock. The limestone immediately below the soil is dissolved by downward-seeping rain water that is freshly charged with carbon dioxide. With time, the bedrock surface is lowered and the fractures into which the water seeps are enlarged. grow in size, soil subsides into the widening voids, from which it is removed by groundwater flowing in the passages below. These depressions are usually deep and are characterized by relatively gentle slopes.

By contrast, sinkholes can also form suddenly and without warning when the roof of a cavern collapses under its own weight. Typically, the depressions created in this manner are steep-sided and deep. When they form in populous areas, they may represent a serious geologic hazard.

As many of our valuable natural resources, groundwater is being exploited at an increasing rate. Thus, problems like saltwater intrution and groundwater contamination occurs at many places. Let us study in detail about how the underground water get contaminated.

Did you know?

The crater like sinkhole in the figure began forming in Winter Park, Florida, on May 8,1981. The giant sinkhole several hundred meter wide after swallowing a three bed room bungalow, half a swimming pool and six porsches-nibbled away at a side street. The crater estimated at between 135mts and 180mts.wide and 38 to 50 mts.deep, grew by 2 to 3 meter and was filling with water.

Saltwater intrusion: In many coastal areas the groundwater resource is being threatened by encroachment of salt water . In order to understand this problem, we must examine the relationship between fresh groundwater and salt groundwater. Figure 7.6 is a diagrammatic cross section that illustrates this relationship in a coastal area underline

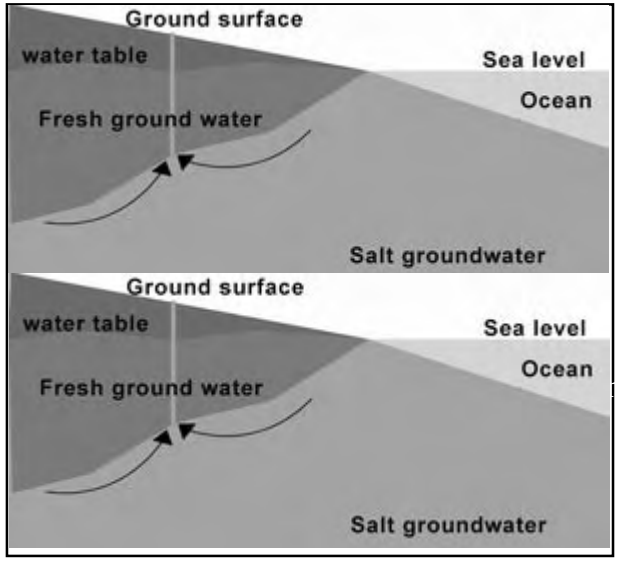


Fig.7.6

by permeable homogeneous materials. Since fresh water is less dense than salt water, it floats on the salt water. Itforms a large, lens-shaped body that may extend to considerable depths below sea level. In such a situation, if the water table is 1 meter above sea level, the base of the fresh water body will extend to a depth of about 40 meters below sea level. Thus when excessive pumping lowers the water table by a certain amount, the bottom of the freshwater zone will rise by 40 times that amount. Therefore, if groundwater withdrawal continues to exeed recharge, the salt water intrudes into the fresh water zone. Deep wells and wells near the shore are usually the first to be affected.

Groundwater contamination: The pollution of groundwater is a serious matter, particularly in areas where aquifers supply a large quantity of water. A very common type of groundwater pollution is sewage. Its sources include an ever-increasing number of septic tanks as well as inadequate or broken sewer systems and barnyard wastes.

If groundwater is contaminated with bacteria from sewage, groundwater may become purified through natural processes. The harmful bacteria may be mechanically filtered out by the sediment through which the water perculates, destoyed by chemical oxidation, and/or assimilated by other organisms. In order for purification to occur, however, the aquifer must be of the correct composition. For example, extremely permeable aquifers such as highly fractured rocks, coarse gravel, or cavernous limestone have such large openings that contaminated groundwater may travel long distances without being cleansed.

Fig.7.7 Well 1 delivering contaminated water

As shown in figure 7.7 , the water flows too rapidly and is not in contact with the surrounding material long enough for purification to occur. Although the contaminated water has travelled a long distance before reaching the well 1, the water moves too rapidly through the limestone to be purified. On the other hand, when water moves through sand or permiable sandstone, it can sometimes be purified within distances as short as a few tens of meters. The openings between sand grains are large enough to permit water movement, yet the movement of water is slow enough to allow ample time for its

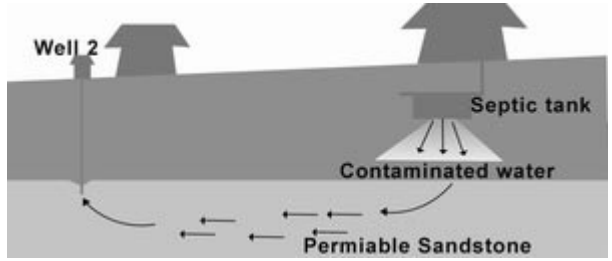


Fig.No.7.8 Well 2 delevering clean water

purification. As illustrated in figure no.7.8 the discharge from the septic tank percolates through the permeable sandstone, it is purified in a relatively short distance, before reaching the well 2.

Other sources of contamination: Other sources and types of contamination also threaten groundwater supplies. These include widely used substances such as fertilizers that are spread across the land surface, and pesticides. In addition, a wide array of chemicals and industrial materials may leak from pipelines, storage tanks and landfills. some of these pollutants are classified as hazardous, meaning that they are highly toxic. As rainwater oozes through the refuse, it may dissolve a variety of organic and inorganic materials. If the leached material reaches the water table, it will mix with the groundwater and contaminate the supply. Since groundwater movement is usually slow, polluted water may go undetected for a considerable time.

Most contamination is discovered only after drinking water has been affected. By this time, the volume of polluted water may be very large,

and even if the source of contamination is removed immediatly, the problem is not solved. Although the sources of groundwater contamination are numerous, the solutions are relatively few. Once the source of the problem has been identified and eliminated, the most common practice in dealing with contaminated aquifers is simply to abandon the water supply and allow the pollutants to be flushed away gradually. But the most effective solution to groundwater contamination is prevention.

Earlier, we have learnt that running water is a powerful agent of erosion. Infact, many of the present-day landscapes were modified by the widespread glaciers of the most recent ice age and still strongly reflect the handiwork of ice. Glaciers, of course, are not just a phenomenon of the geological past. As we shall see in the next lesson, they are still sculpturing and depositing in many regions today.

Learning Outcomes

1. **Understood about the ability of undergroundwater as a powerful erosional agent.**
2. **Understood that the quantity of groundwater depends on the porosity and permiabilty of the soil.**
3. **Understood how the groundwater is getting contaminated.**

Points to Remember:

1 The surface water seeps into the ground because the bedrock, sediments, and soil contain voids or openings. These openings are similar to those of a sponge and are often called pore spaces

2. The quantity of groundwater that can be stored depends on the number of pore spaces present in the material. The rock that consists of such pore spaces are called porus rock.
3. The ratio between volume of pores to the total volume of rock is known as porosity. The ability or capcity of a rock or sediment that allow the water to perculate through its pore spaces is known as permiability.

4. Permeable rock strata or sediments such as sand or gravel that transmit groundwater freely are called aquifers. Impermiable layers composed of materials such as clay that hinders or prevent water movement are termed aquicludes.
5. Water that penetrates downward until it reaches a zone, where pore spaces in sediment and rock are completely filled with water is called Saturation Zone. The water held in this zone is called groundwater. The upper limit of groundwater zone is known as the watertable.
6. The groundwater follows the lines of weakness in the rock, such as joints and bedding planes. As time passes, the dissolving process slowly creates cavities and gradually enlarges them into caverns.
7. The features that are created by the seemingly endless dripping of water over great span of time. These cave deposits, however, are also commonly called dripstones.
8. Stalactities are icicle-like pendents hang from the ceiling of cavern and form where water seeps through cracks above. When the water is forced to flow, and hence deposit, along the outside of the tube and more common conical shape stalactites are created.
9. The term karst topography is derived from a plateau region called Slovenia where such topography is developed. It is located along the northeastern shore of the Adriatic Sea, Yugoslavia
10. Karst areas characteristically exhibit an irregular terrain punctuated with many depressions, called sinkholes or sinks. sinkholes are formed when the limestone immediately below the soil is dissolved by rain water and forms depressions.

EXERCISES

I. Choose the correct answer:

1. The soils and rock strata that are capable of holding water are
   a) aquicludes b) aquifers c) watertable
2. The ratio between volume of pores to the total volume of rock is known as
   a) Porespace b) porosity c) permiability
3. The various dripstone features found in caverns are collectively called
   a) speleotherms b) sinkholes c) caverns

II. Fill in the blanks

1. The quantity of groundwater that can be stored depends on the ---------- of the material.
2. Stalactities are icicle-like pendents hang from the ceiling of the ----------.
3. Impermiable layers composed of materials such as clay that hinders ---------- movement are termed aquicludes.
4. The term --------- topography is derived from a plateau region called Slovenia where such topography is developed.
5. Karst areas characteristically exhibit an irregular terrain punctuated with many depressions, called sinkholes or ----------.

III. Match the following

1. karst topography	Soda straw
2. stalagmites	porosity
3. pore spaces	Slovenia
4. Mammoth cave	Columbia
5. limestone tube	on the cavern's floor
	Kentucky

IV. Answer briefly

1. Differentiate gruondwater from soilwater.
2. What are aquifers?
3. Describe in brief about the pore spaces.
4. Write a brief note on karst topography.
5. How caverns are formed?

V. Explain in detail

1. Illustrate the watertable and explain indetail about Porosity and Permiability
2. Write an essay on "Caverns and its associated features".
3. What are the problems related to the withdrawal of groundwater and the difficulties assosiated with tapping groundwater resources.

ACTIVITIES

1. Collect samples of Sand, gravel and clay in a tray and findout the porosity and permiability.
2. Observe a well at your house or in your neighbourhood during rainy and non rainy seasons and discuss in the class.

8. GLACIERS

Learning Objectives

1. **Knows that many present-day landscapes are the handiwork of ice**
2. **Learns about the movement glaciers.**
3. **Understands the erosional features carved out by the glaciers.**

Many of the present-day landscapes were modified by the widespread glaciers of the most recent ice age and strongly reflect the handiwork of ice. Many of the world's most notable glaciers are in Europe. The largest and most famous is the 2,176-square-kilometer, Malaspina Glacier on Yakutat Bay in Alaska.

Glacier is a large mass of ice that flows slowly over land in the cold polar regions and in high mountain valleys. Snow is the raw material from which glacial ice originates; therefore, glaciers form in areas where more snow falls in winter than melts during summer. The low temperatures in these places enable large amounts of snow to build up and turn into ice. Wherever this occurs year after year, there is a gradual accumulation of snow. These areas where the snow lasts from year to year are known as snowfields (Fig.No.8.1). In the sunny days of summer the surface of a snowfield melts, and the water, sinking into the snow, freezes beneath the surface and helps change the snow to ice. The weight of the snow above also compacts the

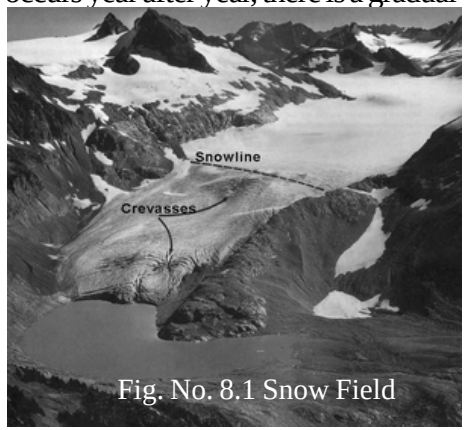


Fig. No. 8.1 Snow Field

snow below. By the melting and refreezing of the water and by pressure, the larger part of the snow of a snowfield is changed into ice.

On an average, the transformation of snow into glacial ice may take 25 to 100 years. Indeed like running water, groundwater, wind and waves, glaciers are not found in many parts of the world today, but are located in remote areas. There are two main kinds of gleciers, namely 1. Continental glaciers and Valley glaciers. They differ in shape, size, and location.

Continental glaciers: Continental Glaciers are also called icesheets. They are broad and extremely thick. They cover vast areas of land near the earth's polar regions. Glaciers of this type build up at the center and slope outward to flow toward the sea in all directions. The continental glaciers (Fig.No.8.2) on Greenland and Antarctica bury plateaus and conceal the entire landscape except for the highest peaks. In the northern hemisphere, Greenland is covered by imposing ice sheet that occupies 1.7 million square kilometers, or 80 percent of this large island. Averaging nearly 1500 meters thick, in places the ice extends 3000 meters above the islands bedrock floor. In the south polar region, the huge Antarctic Ice sheet attains a maximum thickness of nearly 4300 meters and covers an area more than 13.9 million square kilometers about 12 times the area of India. This huge volume of ice contains more than 90 percent of the world's stock of ice and about 75 percent of its fresh water.

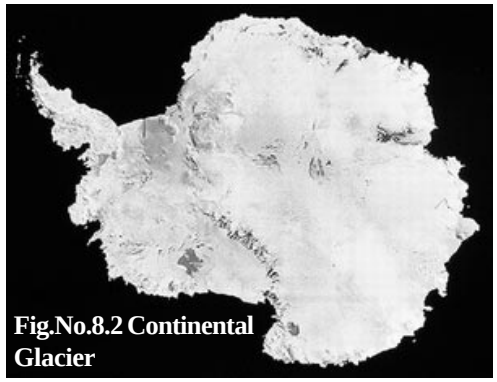


Fig.No.8.2 Continental Glacier

Valley glaciers: Valley Glaciers otherwise known as alpine glaciers are long, narrow bodies of ice that fill high mountain valleys. Each glacier is a stream of ice, bounded by precipitous rock walls flowing

down the valley from an accumulation center near its head. Like rivers, valley glaciers can be long or short, wide or narrow, single or with branching tributaries. Generally the widths of alphine glaciers are small compared to their lengths. Some extend for just a fraction of a kilometer, where as others go on for many tens of kilometers. In mountains near the equator, such as the northern Andes of South America, valley glaciers occur at elevations above 4,570 meters. They occur at lower elevations in the European Alps, the Southern Alps of New Zealand, and other mountain ranges nearer the poles.

In addtion to continental and valley glaciers, other type of glaciers are also identified. Covering some uplands and plateaus are masses of glacial ice called ice caps. Ice caps occur in many places, including Ice land and several of the large islands in the Arctic Ocean. Piedmont glaciers occupy broad lowlands at the base of steep mountains and form where one or more valley glaciers emerge from the confining walls of mountain valleys.

As glaciers pass over an area, they help shape its features. They create a variety of land forms by means of erosion. It also transports and deposits eroded rock debris. The movement of glaciers over irregular terrain result in cracks called crevasses (Fig.No.8.3). These gaping cracks, make travel across glaciers very dangerous. Cracks may extend to depths of 5 meters.

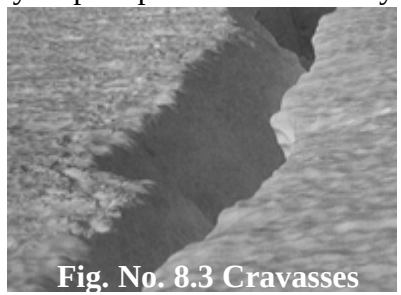


Fig. No. 8.3 Cravasses

Glacial erosion: Glaciers are capable of great amounts of erosion. Glaciers erode the land primarily in two ways. First, as a glacier flows over a fractured bedrock surface, it loosens and lifts blocks of rock and incorprates them into the ice.This process is known as **plucking,** occurs when meltwater penetrates the cracks and joints of bedrock

beneath a glacier and freezes. As the water expands, it exerts tremendous leverage that pries the rock loose. In this manner sediment of all sizes, ranging from particles as fine as flour to blocks as big as houses, becomes part of the load of the glacier.

The second major erosional process is **abrasion.** As the ice and its load of rock fragments slide over bed rock, they function as a kind of sandpaper to smooth and polish the surface below (Fig.No.8.4). The pulverised rock produced by the glacier is appropriately called **rock**

Fig.No.8.4 Polished surface

flour. So much rock flour may be produced that meltwater streams flowing out of a glacier often have grayish appearance and offer visible evidence of the grinding power of ice. The rock surfaces over which the glacier moves may also become highly polished by ice and its load of finer particles.

Finally, it should be pointed out that, the rate of glacial erosion is highly variable. This variation is largely controlled by four factors: 1. rate of glacial movement ; 2. thickness of the ice; 3. shape, abundance, and hardness of the rock fragments contained in the ice at the base of

the glacier; and 4. the erodibility of the surface beneath the glacier. Variations in any or all of these factors from time to time and /or from place to place mean that the features, effects, and degree of landscape modification in glaciated regions can vary greatly.

Landforms created by Glacial Erosion: Although the erosional potential of continental glacier is enormous, landforms carved by these huge ice masses usually do not inspire the same degree of wonderment as do the erosional features created by valley glaciers. Much of the rugged mountain scenery so celebrated for its majestic beauty is the product of glacial erosion.

a. Glaciated Valleys: In a mountainous region, the valley itself is often a dramatic sight. Rather than creating their own valleys, glaciers follow the courses of pre-existing river valleys. Prior to glaciation moutain valleys are characteristically narrow and V -shaped. However, during glaciation these narrow valleys undergo a transformation as the glacier widens and deepens them, creating a U-shaped glacial trough (Fig.No.8.5) .

Fig.No.8.5 U-shaped glacial trough

In addition to producing a broader and deeper valley, the glacier also straightens the valley. As the ice flows around sharp curves, its great erosional force remove the spurs of land that extend into the valley.

Since the intensity of glacial erosion depends in part upon the thickness of the ice, main glaciers cut their valleys deeper than do their smaller tributary glaciers. Thus, after the glaciers have receded, the valleys of feeder glaciers stand above the main glacial trough and are termed as hanging valleys. Rivers flowing through hanging valleys may produce spectacular waterfalls.

b. Cirques and Tarn lakes: At the head of a valley, the glacier erode the sides of the mountain and the bottom of the glaciers by frost wedging and plucking. This action produces a armchair like depression called a cirque (Fig.No. 8.6). Although the origin of cirques is still not totally clear, is a very characteristic and often imposing feature. After the glacier has melted away the cirque is often occupied by a small lake called a tarn.

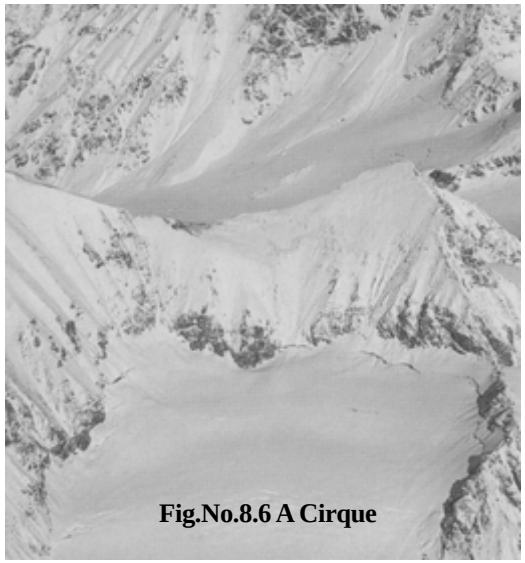


Fig.No.8.6 A Cirque

Aretes and Horns: In addition to glacial troughs and other related features just discussed, a vistor could see, the sinuous, sharp-edged ridges called aretes and sharp, pyramid-like peaks called horns

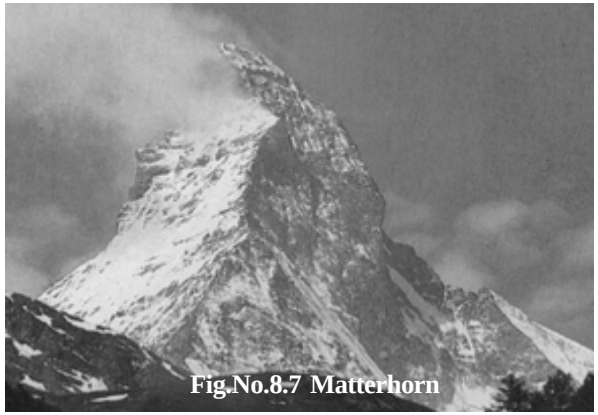


Fig.No.8.7 Matterhorn

projecting above the surroundings. Both features can originate from the enlargement of cirques. In the case of horns, a group of cirques

around a single high mountain are responsible. As the cirques enlrage and converge, an isolated horn is produced. Certainly the most famous example is the classic Matterhorn in the Swiss Alps (Fig.No. 8.7). Aretes can be formed in a similar manner except that the cirque are not clustered around a point but rather exist on opposite sides of a divide. As the cirques grow, the divide seperating them is reduced to a very narrow knife-like partition. An arete, however, it may created another way. When two glaciers occupy parallel valleys, an arete can form when the divide seperating the moving tongues of ice is progressively narrowed as the glaciers scour and widen their valleys.

Did you know?

How much water is stored as glacial ice? Estimates by the U.S Geological Survey indicate that only slightly more than 2 percent of the world's water is accounted for by the glaciers. But this small figure may be misleading when the actual amount of water are considered. Furthermore 80 percent of world's ice and nearly two thirds of the earth's fresh water are represented by Antarctica's ice sheet. If this ice melted the sea level would rise an estimated 60-to 70 meters, and the ocean would inundate many densely populated coastal areas. If Moreover, Antarctica's ice sheets are melted at a uniform rate, it could feed, 1. the Mississippi river for more than 50,000 yeras, 2. all Amazon river for aproximately 5000 years, or 3. all the rivers of the world for about 750 years.

Glacial deposits: Glaciers are capable of acquiring and transporting a huge load of debris as they slowly and relentlessly advance across the land. Of course these materials must be deposited when the ice eventually melts. Thus in regions of deposition, glacial sediment can play a truly significant role in shaping the physical landscape.

Glacial deposits consist of clay, silt, sand, and rocks of various sizes. Such materials deposited directly by the glacier are known as till. Till is deposited as glacial ice melts and drops its load of rock fragments. Unlike moving water and wind, ice cannot sort the sediments it carries;

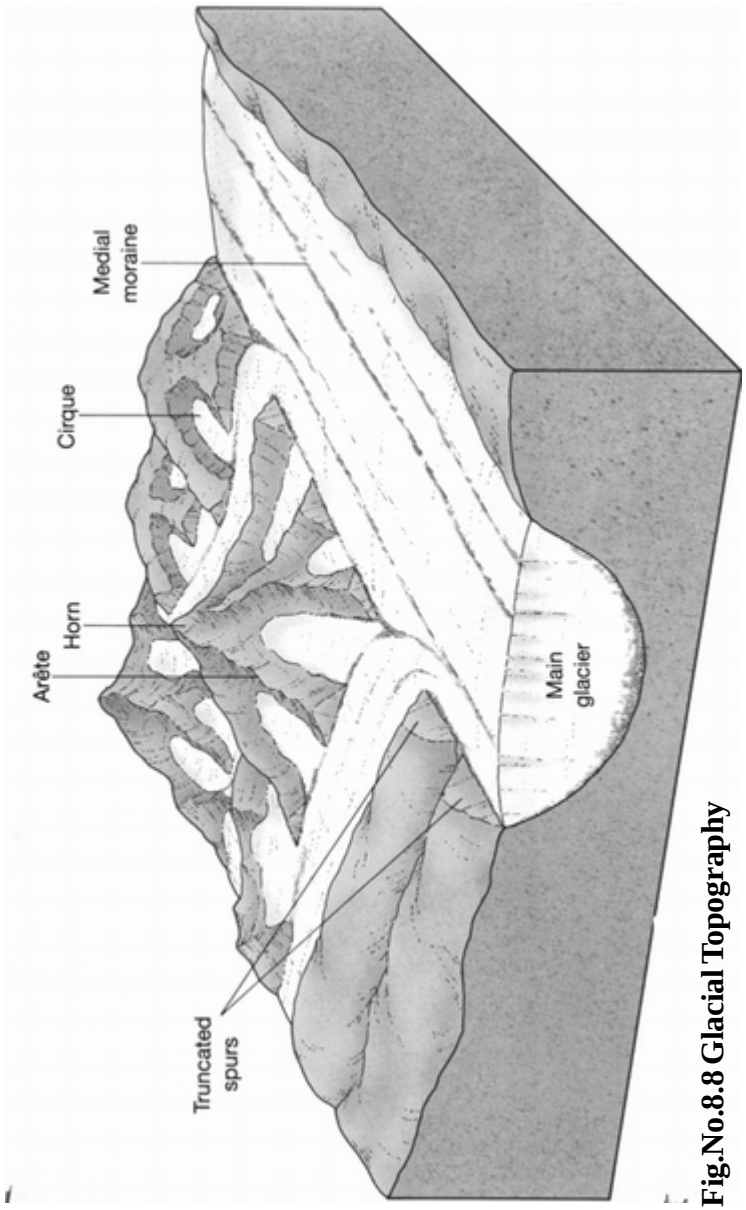


Fig.No.8.8 Glacial Topography

therefore deposits of till are characteristically unsorted mixtures of many sizes. Big boulders found in the till were transported as far as 500 kilometers from their source area and, in a few instances, more than 1000 kilometers. The most common term for landforms made of glacier deposits is called moraines. They are different kinds of moraines. They are: a.end moraines and ground moraines and b. lateral and medial moraines (Fig.No.8.8).

a. End moraines and ground moraines: An end moraine is a ridge of till that forms at the terminus of both valley and continental glaciers. This forms when ice is melting and evaporating near the end of the glacier at a rate, equal to the forward advance of the glacier from its region of nourishment. As the ice melts, the till is droped and end morain grows. Therefore, the larger the ice front remains stable, the larger the ridge of till becomes. In this manner a large quantity of till is deposited as the ice melts away, creating a rock-strewn, undulating plain. This rolling layer of till laid down as the ice front recedes is termed ground moraine.

b. Medial and Lateral moraines: Valley glaciers produce two types of moraines that occur exclusively in mountain valleys. The first of these is called a lateral moraine. As we learned earlier, when a valley glacier moves downvalley, the ice erodes the sides of the valley with great efficiency. In addition, large quantities of debries are added to the glacier's surface as rubble falls or slides from higher up on the valley walls and collects on the edges of the moving ice. When the ice eventually melts, this accumulation of debris is dropped next to the valley walls. These ridges of till paralleling the sides of the valley constitute the lateral moraines. When two valley glaciers coalesce, the till that was once carried along the edges of each valley glaciers joins to form a single ice stream. When the ice evetually melts, the deposits of lateral moraines within this newly enlarged glacier, is called medial moraine. This second type of medial moraine is unique to valley glaciers.

In some areas that were once covered by continental ice sheets, a special variety of glacial landscape exists. This landscape is characterized by drumlins and eskers. A drumlin is an oval-shaped hill that usually consists of rock debris. Most drumlins occur in clusters called drumlin fields. Some fields may contain about 10,000 drumlins.

Finally, on some glacial landscapes long, narrow ridges composed largely of sand and gravel are present. Some ridges are more than 100 meters high with lengths in excess of 100 kilometers. These ridges are known as eskers, were deposited by the meltwater rivers flowing in confined channels within, on top of, and beneath a mass of motionless, stagnant glacial ice.

Compared with other erosional agents such as river, underground water and glaciers, sea waves are relatively insignificant erosional agent. Let us study in detail about the waves and its erosional work in the next lesson.

Learning Outcomes

1. **Understood about the ability of glaciers as one of the powerful agent of erosion.**
2. **Understood that theprimary erosional work carried out by glaciers.**
3. **Understood that the present day landscapes are the handiworks of glaciers.**

Points to Remember:

1. There are two main kinds of glaciers, continental glaciers and valley glaciers. Continental Glaciers, also called icesheets, are broad, thick ice sheets that cover vast areas of land near the earth's polar regions. Valley Glaciers or alphine glaciers are long, narrow bodies of ice that fill high mountain valleys.
2. When glacier flows over a fractured bedrock surface, it loosens and lifts blocks of rock and incorporates them into the ice. This process is known as Plucking.

3. Abrasion is the processes by which the ice and its load of rock fragments slide over bed rock, smooth and polish the surface below.
4. Prior to glaciation moutain valleys are characteristically narrow and V - shaped. However, during glaciation these narrow valleys undergo a transformation as the glacier widens and deepens them, creating a U-shaped glacial trough.
5. At the head of a valley, the glacier erode the sides of the mountain and the bottom of the glaciers by frost wedging and plucking. This action produces a armchair like depression called a cirque. After the glacier has melted away the cirque is often occupied by a small lake called a tarn.
6. As the cirques enlrage and converge, an isolated horn is produced. An arete can form when cirques grow, the divide seperating them is reduced to a very narrow knife-like partition. An arete can also form when the divide seperating the moving tongues of ice is progressively narrowed as the glaciers scour and widen their valleys.
7. An end moraine is a ridge of till that forms at the terminus of both valley and continental glaciers. A large quantity of till is deposited as the ice melts away, creating a rock-strewn, undulating plain of till termed ground moraine.
8. These ridges of till paralleling the sides of the valley constitute the lateral moraines. Medial moraines are created when two valley glaciers coalesce to form a single ice stream.
9. A drumlin is an oval-shaped hill that usually consists of rock debris. Most drumlins occur in clusters called drumlin fields. A long, narrow ridges of sand and gravel are known as eskers.

EXERCISES

I. Choose the correct answer:

1. A large mass of ice that flows slowly over land in the cold polar regions and in high mountain valleys are known as
   a) glaciers b) rivers c) creeks
2. After the glacier has melted away the cirque basin is often occupied by a small lake called
   a) a cirque b) a tarn. c) a depression
3. An oval-shaped hill that usually consists of rock debris is called
   a) Till b) Drumlins c) Eskers

II. Fill in the blanks

1. Those areas where the snow lasts from year to year are known as ----------.
2. The glacier widens and deepens the V-shaped valleys into U-shaped glacial ----------.
3. As the cirques enlrage and converge, an isolated ---------- is produced.
4. An ---------- can form when cirques grow, the divide seperating them is reduced to a very narrow knife-like partition
5. These ridges of till paralleling the sides of the valley constitute the ---------- moraines.

III. Match the following

1. Medial moraines	Swiss Alps
2. Greenland	feeder glaciers
3. Matterhorn	pulverised rock
4. hanging valleys	Till
5. rock flour	continental glacier
	single ice stream

IV. Answer briefly

1. Differentiate continental from Valley glaciers.
2. What are Tills?
3. Describe in brief about abrasion.
4. Write a brief note on Antarctic Ice sheet .
5. How Cirques are formed?

V. Explain in detail

1. Illustrate the landforms created by Glacial erosion and describe
2. Write an essay on “Moraines”.
3. Give a detailed account about the formation and movement of Glaciers.

ACTIVITIES

1. Discuss in the class about the reasons for melting of glacial ice.
2. Dramatise the effects of melting of ice and coastal belts.

9.OCEAN WAVES

Learning Objectievs

1. **Knows that striking feature of the oceans is the constant motion of their surfaces.**
2. **Learns about the causes for wave formation.**
3. **Understands the coastal features curved out by the waves.**

Next to their vastness, the most striking feature of the oceans and other large bodies of water is the constant motion of their surfaces. Waves are generated by the combined effect of the downward and shearing forces of the wind upon the surface of the water. Waves encountered in the oceans are so irregular that no two are exactly alike. To the eye, waves give the effect of water travelling from one point to another. For example, when a stone is dropped into a quiet pool, water appears to travel toward the edge of the pool from the point where the pebble struck. In reality, the water travels very little; what is seen is the wave traveling along the surface of the water. A leaf floating on the pool would merely pob up and down as each wave passed beneath it and would progress very little along the water's surface.

In an ocean wave, water moves up and down. No forward motion of water occurs as the wave goes through the water. The action of an ocean wave resembles the waves you can make in a rope that is tied to a tree. When you shake the free end of the rope, waves run along it. But the rope itself does not move forward. When an ocean wave reaches land, however, it starts to drag on the bottom. Then the water also moves.

Waves generated by the wind may range in height from less than a meter to as much as 18 meters. The wind causes most ocean waves, from small ripples to giant hurricane waves more than 30 meters high.

Fig.No.9.1 The breaking waves

The size of such waves depends on wind speed, on how long the wind blows, and on how far it blows over the ocean. As the wind continues to blow out at sea, the waves grow to their greatest size. Finally a critical point is reached when the steep wave front is unable to support the wave, and it collapses, or breaks. The breaking waves are called whitecaps. The turbulent water created by breaking waves is called surf.

The action of ocean waves changes the shoreline. Waves cut away sloping land and creat steep cliffs. They break up the exposed rocks and form beaches. The movement of the waves and currents shapes beaches and builds up sand bars along the shore. Waves also carry beach sand away, particularly during storms when the waves are high and choppy.

Wave Erosion: During period of calm weather action of the wave is minimal. However, just as rivers do most of their work during floods, so too the waves accomplish most of their work during stormy weather. The impact of high, strom induced waves against the shore can be awesome in its violence. Each breaking wave may hurl thousands of tons of water against the land. At that time water is forced into every opening, causing air in the cracks to become highly compressed by the thrust of crashing waves. When the wave subsides, the air expands rapidly, dislodging rockfragments and enlarging and extending pre-existing fractures.

In addtion to the erosion caused by wave impact and pressure, the sawing and grinding action of the water armed with rock fragments, is also important. In fact, abrasion is probably more intense in the surf zone than in any other environment. Smooth, rounded stones and pebbles along the shore are obvious reminders of grinding action of rock against rock in the surf zone. Further, such fragments are used as tools by the waves as they cut horizontally into the land.

Millions of tons of sediments moved by waves along the shore each year. No wonder that the beaches along the shore have been characterized as “rivers of sand” At any point along a beach there is likely to be more sediment that was derived elsewhere than materials eroded from the shore area immediately behind it.

Shoreline features: Waves provide most of the energy that shapes and modifies shorelines. Where the land and sea meet, waves that may have travelled unimpeded for hundreds or thousands of kilometers suddenly encounter a barrier that will not allow them to advance farther.

Did you Know?

How is a warmer atmosphere related to a global rise in sea level? First, higher temperatures can cause glacial ice to melt. About one half of the 10 to 15 centimeter rise in sea level over the past century is attributed to the melting of small glaciers and ice sheets. second. a warmer atmosphere causes an increase in ocean volume through the higher air temperatures, raise of the upper layers of the ocean. This, in turn, causes the water to expand and sea level to raise. This results in strom development. Of course, an increase in storm activity would compound an already serious problem in coastal areas. Since rising sealevel is a gradual phenomenon it may be overlooked by coastal residents as a significant contributor to shore line erosion problems. Although a given storm may be the immediate cause for the magnitude of its destructions may result from the relatively small sea level rise that allowed the storm’s power to cross a much greater land area.

Infact, the shore is the place where a practically irresistable force confronts an almost immovable object. The conflicts that results is never-ending and sometimes dramatic.

A number of mechanical and chemical effects produce erosion of rocky shorelines by waves. Depending on the geology of the coastline, nature of wave attack, and long-term changes in sea-level as well as tidal ranges, erosional landforms such as wave-cut notches, sea cliffs and even unusual landforms such as caves, sea arches, and sea stacks can be formed.

Wavecut Platform: Initially, the cutting action of the waves against the base of coastal land produces wave cut cliffs. As erosion progressess, rocks overhanging the notch at the base of the cliff crumble into the water, the cliff retreat. A relatively flat, bench like surface called **wave-cut platform** is left behind by the receding cliff. The platform broadens as wave attack continues. Some of the debris produced by the breaking waves remains along the water's edge as part of the beach, while the remainder is transported farther seaward.

Fig. 9.2 Sea cliff and wave-cut platform

Sea caves and arches: Headlands that extend into the sea are vigorously attacked by waves because of refraction. The surf erodes the rock selectively, wearing away the softer or more highly fractured rock at the fastest rate. At first, sea caves may form. When two caveson opposite sides of a headland unite, a sea arch results. Finally the arch

falls in, leaving an isolated remanent, or sea stack, on the wave-cut platform. Eventually it too will be consumed by the action of the waves.

Spits, Baymouth bars and Tombolo: Where beach drift and longshore currents are active, several features related to the movement of sediments along the shore may develop (Fig.No.9.3). Spits are elongated ridges of sand that project from the land into the mouth of an adjacent bay. Often the end in the water hooks landward in response to wave-generated currents. The term baymouth bar is applied to a sand bar that completely crosses a bay, sealing it off from the open ocean. Such a feature tends to form across bays where currents are weak, allowing a spit to extend to the other side. A tombolo, a ridge of sand that connects an island to the mainland or to another island, forms in much the same manner as a spit.

Compared to running water and moving ice, wind is relatively an insignificant erosional agent. But wind deposits are significant features in some regions. Let us learn about the wind, an other agent of erosion, in the following lesson.

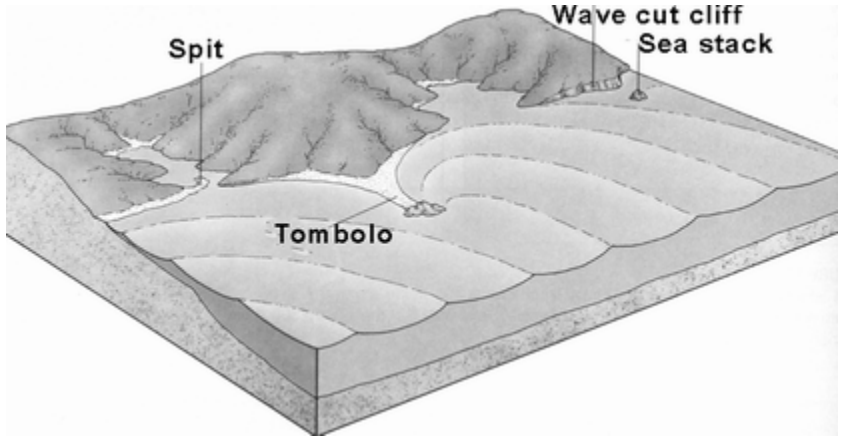


Fig.No.9.3 Spits, Baymouth bars and Tombolo

Learning Outcomes

1. **Understood that wind is the cause for the waves.**
2. **Understood that the wave is an agent of erosion.**
3. **Understood the coastal landscapes.**

Points to Remember:

1. The size of waves depends on wind speed, on how long the wind blows, and on how far it blows over the ocean. When a critical point is reached, it breaks. The breaking waves are called whitecaps. The turbulent water created by breaking waves is called surf.
2. Initially, the cutting action of the waves against the base of coastal land produces wave cut cliffs. As erosion progressess, rocks over hanging the notch at the base of the cliff crumble into the water, the cliff retreat. A relatively flat, bench like surface called wave-cut platform is left behind by the receding cliff.
3. Sea caves form when the surf erodes the coastal rock selectively, wearing away the softer or more highly fractured rock at the fastest rate. Sea arch result when two caves on opposite sides of a headland unite. when the arch falls Sea stack is formed as an isolated remnant.
4. Spits are elongated ridges of sand that project from the land into the mouth of an adjacent bay.
5. The term baymouth bar is applied to a sand bar that completely crosses a bay, sealing it off from the open ocean.
6. A tombolo, a ridge of sand that connects an island to the mainland or to another island, forms in much the same manner as a spit.

EXERCISES

I. Choose the correct answer:

1. The breaking waves are called
   a) waves b) whitecaps. c) Surf
2. A ridge of sand that connects an island to the mainland or to another island is called
   a)a tombolo b) a spit c) a sea stock

3. A relatively flat, bench like surface is left behind by the receding cliff is called
   a) Sea arch b) Sea cave c) Wave-cut platform

II. Fill in the blanks

1. Initially, the cutting action of the waves against the base of coastal land produces ----------.
2. Million tons of sediments moved by ---------- along the shore each year.
3. The term ---------- is applied to a sand bar that completely crosses a bay, sealing it off from the open ocean.
4. When the Sea arch falls ----------is formed as an isolated remnant.

III. Match the following

1.	Sea arch	bench like surface
2.	Baymouth bar	a ridge of sand
3.	wave-cut platform	Cliff
4.	beach drift	a sand bar
5.	A tombolo	isolated remnant. along the beach

IV. Answer briefly

1. Differentiate beach drift from obliques.
2. What are Tombolos?
3. Describe in brief about surf zone.
4. Write a brief note on Wave cut platform.
5. How beaches are formed?

V. Explain in detail

1. Illustrate the sea shore features and describe.

ACTIVITIES

1. If you happened to visit a coastal area, observe the coastal features.
2. If your school is located in a coastal district pay a visit to thecoast.

10. WIND

Learning Objectives

1. **Knows that wind is relatively insignificant erosional agent.**
2. **Learns about the causes for sand stroms and dust stroms**
3. **Understands the formation of sand dunes.**

Air that moves across the earth's surface is called wind. Wind may blow so slowly and gently that it can hardly be felt. Or it may blow so fast and hard that it dash against the buildings and pushes down large trees. Strong cyclonic winds will damage ships and floods the land. Wind can blow away soil from agricultural field and leaves rock fragments. So, crops can not cultivated again inthe same agricultural field. Thus wind erodes the surface of one area , transports and deposits the eroded materials to another area.

1. Wind Erosion: Compared to running water and moving ice, wind is relatively insignificant erosional agent. Even in deserts, few major erosional landforms are created by the wind. Although wind erosion is not restricted to arid and semiarid regions, it does its most effective work in these areas. In humid places moisture binds particles together and vegetation anchors the soil so that wind erosion is negligible. For, wind to be effective, dryness and scanty vegetation are prerequisites. When such circumstances exit, wind may pick up, transport, and deposit great quantities of fine sediments.

Wind works in two ways to erode the materials. They are: **a. by deflation and b. by abrasion**

a. By deflation: One way that winds erode is by deflation, that is, the lifting and removal of loose material. The most noticeable results of

deflation in some places are shallow depressions which are quite appropriately called **blowouts.** The blowouts range in size from small dimples less than one meter deep and three meters wide to depressions that approach 50 meters in depth and several kilometers across. The factor that controls the depth of these basins is the local water table. When blowouts are lowered to the water table, damp ground and vegetation prevent further deflation.

b. By abrasion: Like rivers and glaciers, wind erodes by abrasion. In dry regions as well as along some beaches, windblown sand cuts and polishes exposed rock surfaces. Abrasion by windblown sand, creates stones called **ventifacts**.The side of the stone exposed to the prevailing wind is abraded, leaving it polished, pitted, and with sharp edges. If the wind is not consistently from one direction, and the pebbles become reoriented, it may have several faceted surfaces.

2. Wind Transportation: Moving air, like moving water, is turbulent and able to pick up loose debris and transport it to other locations. Just as in a river, the velocity of wind increases with height above the surface. Also like a river, wind transports fine particles in suspension while the heavier ones are carried as bed loads. However, the transport of sediment by wind differs from that of running water in two significant ways. First, wind has a low density compared to water; thus it is not capable of picking up and transporting coarse materials. Second, because wind is not confined to channels, it can spread sediment over large areas, as well as high into the atmosphere.

a. Bed loads: The bed load carried by wind consists of sand grains. The movement of sand grains begins when wind reaches a velocity sufficient to lift the sand grains. At first, the sand rolls along the surface. Upon striking another grain, one or both of the grains may jump into the air. Once in the air, the sand is carried forword by the wind until gravity pulls the grain back towards the surface. When the sand hits the surface, it either bounces back into air or dislodges other grains

which then jump upward. In this manner a chain reaction is established, filling the air near the ground with saltating sand grains in a short period of time.

Bouncing sand grains never travel far from the surface. Even when winds are very strong, the height of the saltating sand seldom exceeds one meter and under less extreme conditions is usually confined to heights no grater than one-half meter. Some sand grains are too large to be thrown into the air by impact from other particles. When this is the case, the energy provided by the impact of the smaller saltating grains derives the larger grains forward. Estimates indicate that between 20 and 25 per cent of the sand transported in a sandstrom is moved in this way.

Sandstorms: Sand stroms are associated with desert areas and occur when high winds lift particles of sand into the air and drive them with a force that can etch glass and scour paint from automobiles and other metal or wood surfaces. Sand particles in these storms seldom rise more than 3 meters above the ground, though in rare instances they can be lifted to a height of more than 15 meters. Approaching sandstorms appear as relatively low and well-defined light brown walls that seem to grow as they come closer. They tend to form during the day, when surface heating takes place to the most, and to die out during the night.

b. Suspended load: Unlike sand, dust can be swept high into the atmosphere by the wind. Fine particles are easily carried by the wind, but they are not easily acquired by the turbulent air. The reason is that the wind velocity is practically zero within a very thin layer close to the ground. Thus the wind cannot lift the sediment by itself. Instead the dust must be ejected or spattered into the moving current of the air by bouncing sand grains or other disturbances. This can be explained by a dry unpaved country road on a windy day. Left undistrubed, little dust is raised by the wind. However, as a vechicle, or truck moves

over the road, the previuosly smooth layer of silt is disturbed, creating a thick cloud of dust.

Dust storms: Dust stroms are usually associated with areas where agricultural land has been left exposed to the elements or has dried out during times of drought. Rising winds lift the loose soil high into the air and carry it for hundreds of kilometers. Depending on the color of the soil they are carrying, may appear black, reddish, or yellowish brown. The fine particles of dust filter into everything, under tightly closed doors, into machine parts, and even into locked cupboards. People indoors during a dust storm can even feel the grit between their teeth.

3. Wind Deposition: Although wind is relatively unimportant as a producer of erosional landforms, wind deposits are significant features in some regions. Accumulations of windblown sediment are particularly conspicuous in the world's dry lands and along many sandy coasts. Wind deposits are of two distinctive types: **a.Sand dunes and b.Loess.**

a. Sand dunes: As in the case with running water, wind drops its load of sediments when velocity falls and the energy available for transport diminishes. Thus sand begins to accumulate wherever an obstruction across the path of wind slows the movement of the air. Unlike many deposits of silt, which form blanket-like layers over large areas, winds commonly deposit sand in mounds called **dunes** (Fig no.10.1).

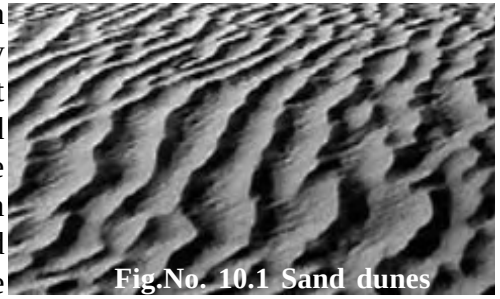


Fig.No. 10.1 Sand dunes

Formation of a dune: As moving air encounters an object, such as a clump of vegetation or a rock, the wind sweeps around and over it,

leaving a shadow of slower-moving air behind the obstacle as well as a smaller zone of quieter air just infront of the obstacle. Some of the saltating sand grains moving with the wind come to rest in these wind shadows. As the accumulations of sand continues, it becomes a more imposing barrier to the wind and thus a more efficient trap for even more sand. If there is a sufficient supply of sand and wind blows steadily for a long enough time, the mound of sand grows into a dune. Sand dunes are of three types. They are:

a. Barchan dunes: The dunes form where the supply of sand are limited and the surface is relatively flat, hard, and lacking vegetation.

Fig. 10.2 Barchan Dunes

Such single sand dunes shaped like crescents and with their tips pointing downwind are called barchan dunes. When the wind direction is nearly constant, the crescent form of these dunes is nearly symmetrical. However when the wind direction is not directly fixed one tip becomes longer than the other.

b. Transverse Dunes: In regions where the prevailing winds are steady, sand is plentiful and vegetation is sparse or absent dunes form a series of long ridges that are separated by troughs and oriented at right angles to the prevailing wind. Because of these orientation, they are termed transverse dunes. Typically, many coastal dunes are of this type.

c. Longitudinal Dunes: In a region, where the direction of wind is constant and limited supply of sand, dunes form parellal to the direction of the wind. Such dunes appear as ridges of sand. These sand ridges are called longitudinal dunes.

Did you know?

Problem of Desertification: The term by itself simply implies the expansion of desert like conditions into non desert areas. On marginal lands used for crops natural vegetaion is cleared. During periods of drought crops fail and the unprotected soil is exposed to the forces of erosion. It is primarily due to inappropriate land use and is aided and accelarated by drought.

In recent decades, villages between Kombai and Bodinaickanur in Theni district of Tamilnadu suffer severely from sand stroms. These villages lie in the rain-shadow region of the Western Ghats. In India, from June to September each year, the moisture laden southwest monsoon winds are very active along the west coast of Kerala. After dropping all their moisture over the western slopes of the Western Ghats, the now dry monsoon winds rush out through the gaps in the mountains. Throughout the southwest monsoon season, the winds blow severely from the southwest, often reaching velocities of between 101 and 105 km per hour. These winds deposit sand on land and degrade fertile, agricultural fields of the rainshadow areas every year. At present, approximately 120 square kilometer of sand dunes stretch for about 20 kilometers along the foothills, requiring large-scale efforts to reclaim lands for agriculture. The desertified area has been expanding: from 110 square kilometer in 1986 to 120 square kilometers in 1994.

2.Loess: In some parts of the world the surface topography is mantled with with deposits of windblown silt. Over periods of perhaps thousands of years dust storms deposited this material, which is called loess. There are two primary sources for this sediment; deserts and glacial deposits. The thickest and most extensive deposits of loess in the world occur in western and northern China, where accumulations of 30 meters are not uncommon. The Yellow River (Hwang Ho) and the adjacent Yellow sea get their names because of this sediment colour. The sources of China's 800,000 square kilometers of loess are extensive desert basins of Central Asia. Unlike the deposit in China, the loess in the United States, as well as in Europe, is indirect product of glaciation. Its source was deposits of stratified drift because the angular mechanically weather particles composing the loess are essentially the same, as the rock flour produced by the grinding action of glaciers.

Learning Outcomes

1. **Understood that wind works in two ways to erode the materials.**
2. **Understood that differences between the sand strom and dust strom.**
3. **Understood the formation of sand dunes.**

Points to Remember:

1. The results of deflation in some places are shallow depressions which are quite appropriately called blowouts. Abrasion by wind blown sand, creates interestingly shaped stones called ventifacts.
2. Sand storms are associated with desert areas but dust storms are usually associated with areas where agricultural land has been left exposed to the elements or has dried out during times of drought.
3. Sand begins to accumulate wherever an obstruction across the path of wind slows the movement of the air and commonly deposit sand in mounds or ridges called dunes.
4. In some parts of the world the surface topography is mantled with with deposits of windblown silt. Over periods of perhaps thousands of years dust storms deposited this material, which is called loess.

5. Single sand dunes shaped like crescents and with their tips pointing downwind are called barchan dunes. A series of long ridges that are separated by troughs and oriented at right angles to the prevailing wind. Because of these orientation, they are termed transverse dunes. Where the direction of wind is constant and limited supply of sand, dunes form parellal to the direction of the wind. Such dunes are called longitudinal dunes.
6. Unlike the deposit in China, the loess in theUnited States, as well as in Europe, is indirect product of glaciation.

EXERCISES

I. Choose the correct answer:

1. Abrasion by windblown sand, creates interestingly shaped stones called
   a) Blowouts b) Sand dunes. c) ventifacts
2. Sand stroms are associated with
   a) deserts b) Plains c) mountains
3. Deposited material by dust storms is called
   a) Ventifacts b) loess c) Sand dunes

II. Fill in the blanks

1. For wind to be effective, ---------- and ---------- vegetation are prerequisites.
2. Wind erodes the materials by ---------- and by ----------.
3. Abrasion by windblown sand, creates interestingly shaped stones called ----------.
4. The loess in the United States, as well as in Europe, is indirect product of ----------.

III. Match the following

1. blowouts	depletion
2. sand dunes	windblown silt
3. ventifacts	desert
4. loess	sand ridge
5. sand strom	abration
	dust strom

IV. Answer briefly

1. Differentiate sand strom and dust strom.
2. What are ventifacts?
3. Describe in brief about sand dunes.
4. Write a brief note on loess.
5. How blowouts are formed?

V. Explain in detail

1. Write an essay on wind deposits.
2. Describe in detail about the formation of sand dunes.

ACTIVITIES

1. Initiate a discussion in the class about the wind as a “source of energy”.
2. Collect information about the windmills

11. THE OCEANS

Learning Objectives

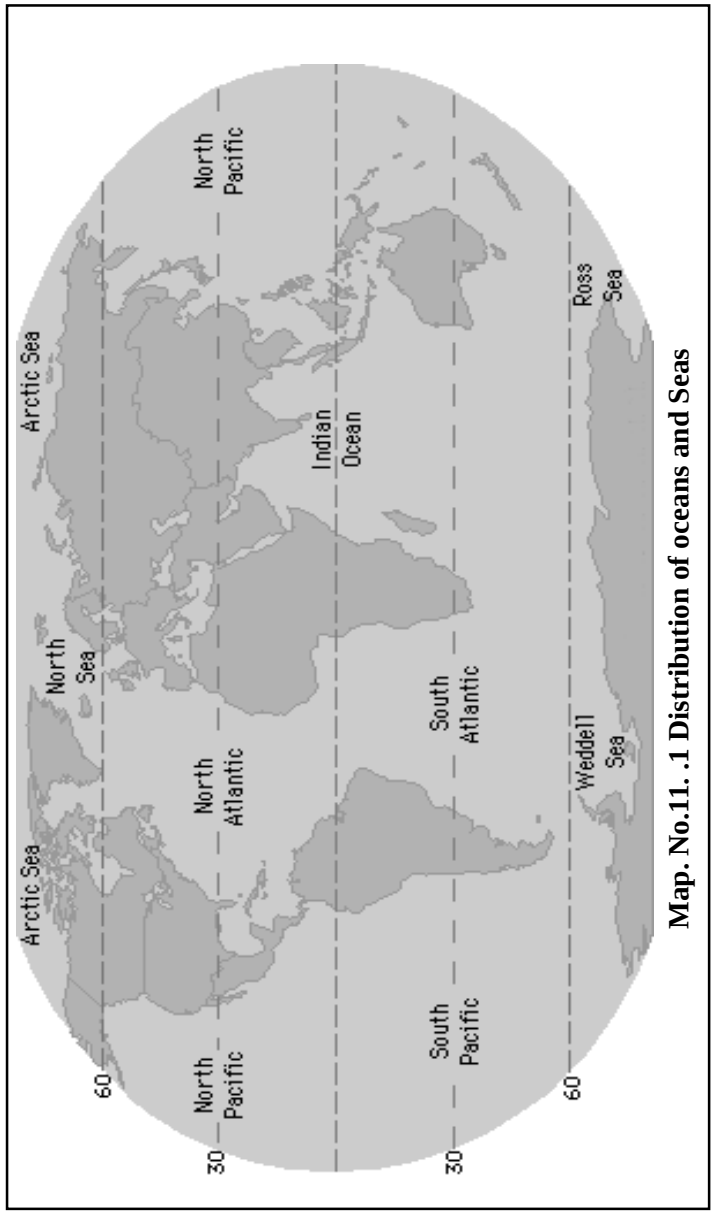
1. **Knows about the ocean floor.**
2. **Understands the currents of the ocean.**
3. **Learns about Coral reefs.**

The largest store of water is in the oceans, which contain over 97% of the Earth's water. Oceans cover approximately 360 million square kilometers of the Earth's surface. On an average, the depth of the world's oceans is about 3.9 kilometers. Maximum depths, however, can exceed 11 kilometers.

The distribution of ocean basins and continents is unevenly arranged over the Earth's surface. In the northern hemisphere, the ratio of land to ocean is about 1 to 1.5. The ratio of land to ocean in the southern hemisphere is 1 to 4. The greater abundance of water in the southern hemisphere has some interesting effects on the environment of this area. Oceans of the world is classified into three groups: the Pacific, the Atlantic (including the Arctic Sea), and the Indian (Map.No.11.1).

The Pacific is the largest ocean, being twice the size of the Atlantic. It covers about a third of the Earth's surface, and contains more than half the water on the planet. It has an average depth of 4.3 kilometers and has few shallow marginal seas, but many islands. Only a few rivers discharge into this ocean basin. This lack of rivers is demonstrated by fact that the surface area of the Pacific is about 1000 percent greater than the land area that drains into it.

The second largest ocean, Atlantic is a relatively narrow body of water that twists between nearly parallel continental masses. The Atlantic Ocean contains the majority of the Earth's shallow seas, but



Map. No.11. .1 Distribution of oceans and Seas

relatively few islands. Some of the shallow seas found in this ocean include: the Caribbean, Mediterranean, Baltic, Arctic Seas, and the Gulf of Mexico. Many streams and rivers discharge into the Atlantic Ocean. This basin also drains some of the world's largest rivers including the Amazon, Mississippi, St. Lawrence, and Congo.

The Indian Ocean is the smallest of the three oceans. It is bordered by the landmasses of Africa and Asia. This ocean has few islands and limited shallow seas. Because of its close proximity to the equator this ocean has the warmest surface ocean temperatures.

Besides the above said three oceans, all water lying south of latitude 55 degrees in the southern hemisphere, is called Sourthen Ocean. In winter, more than half the surface of this ocean is covered by ice.

I. Ocean Floor topography

The topography at the floor of the oceans are divided into three sections: 1.The Continental Shelf 2.The Continental Slope and 3.The Ocean Trough (Fig.No.11.1).

1. The Continental Shelf: Continental Shelf is that part of an ocean that lies close to the continental margin. The depths of the shelves vary from 150 to 200 metres. Similarly, the width varies from place to place. Broad continental shelves are good fishing grounds because they contain suitable conditions for the growth of plankton. Plankton provides food for fish. For example, the broad continental shelves of Northwestern Europe and the coastal areas around Japan are the largest fishing grounds in the world.

2. The Continental Slope: The Continental Slope lies beyond the continental shelf, where the ocean floor slopes downwards. The steep slope connects the continental shelf with the deep ocean floor. The average depth of the slope varies from 3000 to 6000 metres. The depth of the ocean floor suddenly increases where the shelf ends.

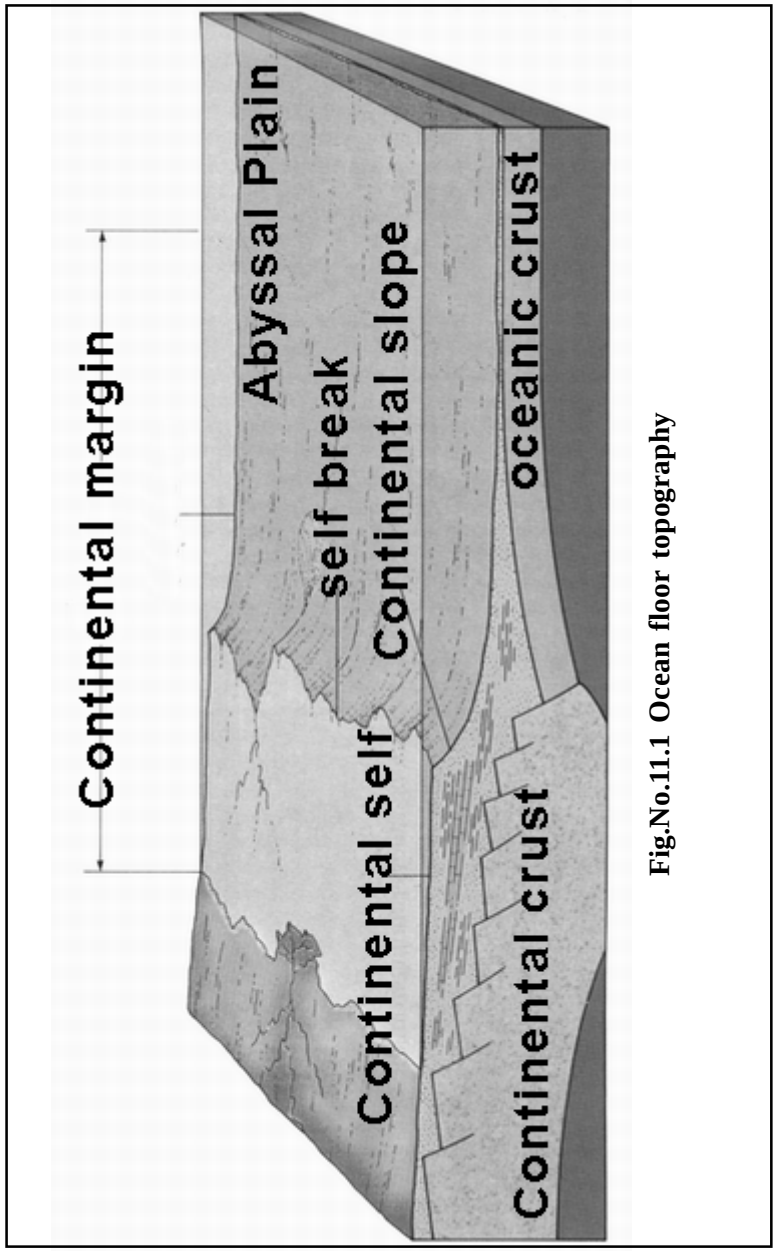


Fig.No.11.1 Ocean floor topography

3. The Ocean Trough: The continental slope ends at the ocean trough, which is like a deep, underwater plain. It consists of islands, mountain ranges, plateaus, deep valleys and plains. These features cover about 40% of the oceans' floors. Mid - Atlantic Ridge is the largest mountain range in the ocean. This range is over 14000 km in length. This ridge has a deep valley where volcanic and earthquake disturbances are quite common. These volcanoes erupt underwater as they do on land. Islands like Hawaii in the Pacific Ocean and the Azores in the Atlantic Ocean were formed through volcanic activity under the ocean. The floor is carpeted with sediment formed by the minute remains of creatures and rocks.

The narrow deeps in the ocean trough are known as trenches. There are numerous trenches in the Pacific Ocean. The Mariana Trench, 11033 metres in depth, is the deepest part of the world. Another incredible feature is the monotanous topography called Abyssal plains. These plains will occasionally be interrupted by the protruding summit of a buried volcanic structure. Abyssal plains are found in all the ocean. However, since the Atlantic Ocean has more extensive abyssal plains than the Pacific.

Did you know?

The ocean's vast expanse first became apparent through voyages of discovery in the fifteenth and sixteenth centuries.An understanding of the ocean floor's varied topography didnot unfold until much later with the historic 3.5 year voyage of the H.M.S. Challenger. From December 1872 to May 1876, the Challenger expedition made first, and still perhaps most comprehensive, study of the global ocean ever attempted by one agency. The 110,000 kilometer trip took the ship and its crew of scientists to every open ocean except the Arctic.

Physical and Chemical Characteristics of Seawater: All oceans and seas contain salt water. They also contains small amounts of dissolved gases. Many of these gases are added to seawater from the

atmosphere. The concentration of gases that can be dissolved into seawater from the atmosphere is determined by temperature and salinity of the water. Increase in the temperature or salinity reduces the amount of gas that ocean water can dissolve.

Some of the important atmospheric gases found in seawater include: nitrogen, oxygen, carbon dioxide, argon, helium, and neon. Compared to the other atmospheric gases, the amount of carbon dioxide dissolved in saturated seawater is unusually in large amount.

Seawater is a mixture of various salts and water. Only six elements and compounds comprise about 99 % of sea salts: chlorine, sodium, sulfur , magnesium , calcium, and potassium . The chlorine ion makes up 55 % of the salt in seawater.

II. The Major Ocean Currents

As the wind blows across the surface of a body of water, the water begins to move. First, small capillary waves are formed; tiny ripples of waves which appear like a brushstroke across the water's surface. If the wind continues to blow, larger waves appear, momentum is transferred to the water, and the water begins to move. This movement of water in the ocean is referred as Currents. There are two types of currents:

A. The Surface Current and B. Deep Ocean Currents.

A. The Surface Current : We have learnt in the VII standard that differential heating of the earth gives rise to global wind patterns. As global winds are persistent, these winds create "permanent" currents on the surface of the ocean. Surface currents are subject to the Coriolis effect, just like the wind, and it begins to bend. In the Northern Hemisphere, water is deflected to the right of the direction of the wind; in the Southern Hemisphere, water is deflected to the left. The net effect is that surface currents move at a 45 degree angle to the wind.

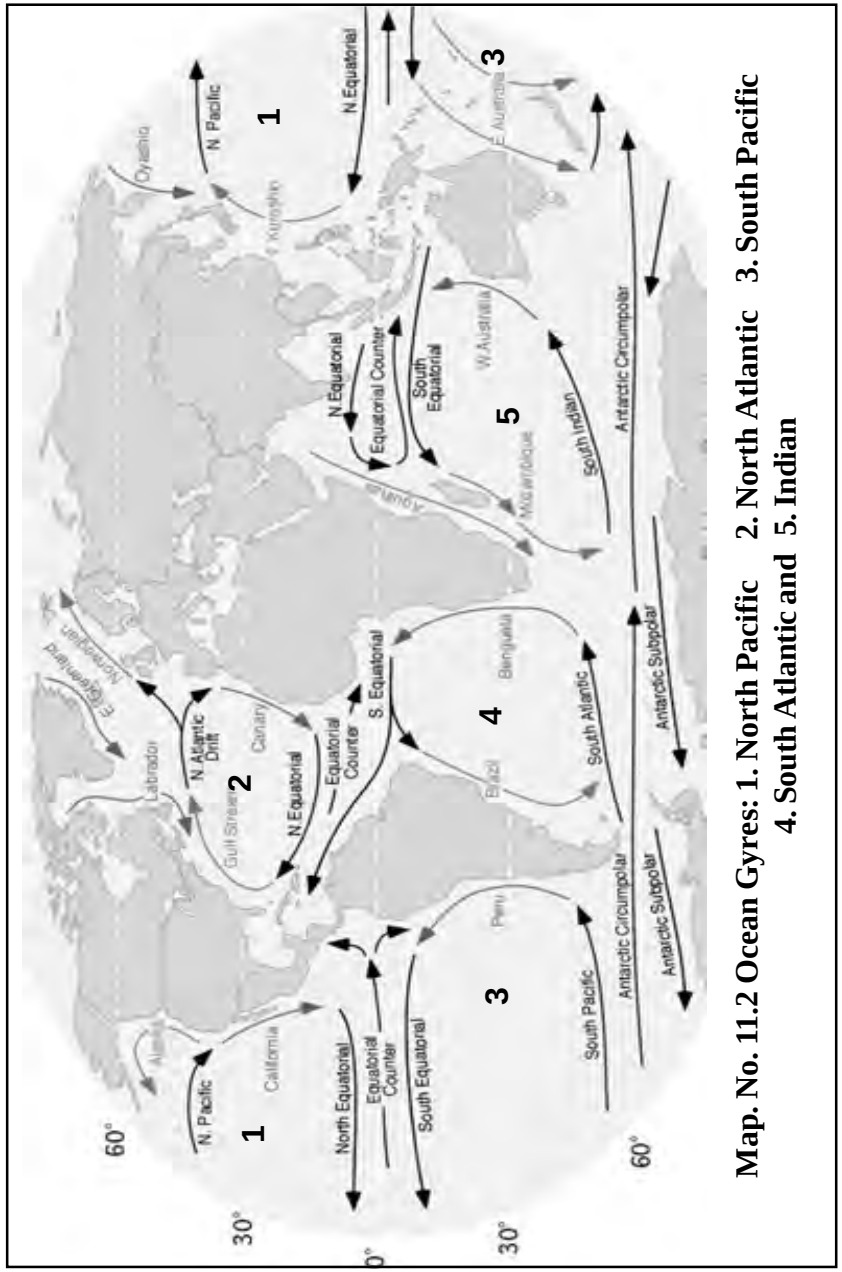
On a global scale, surface currents are constrained by the continental masses found bordering the three oceans. Continental borders cause these currents to develop an almost closed circular pattern. This circular pattern of current is called a gyre (Map No.11.2).

Strucutre of a Gyre: A typical gyre displays four types of joined currents: 1. two boundary currents oriented north-south and flowing parallel to the continental margins; and 2. two east-west aligned currents found respectively at the top and bottom ends of the gyre. Boundary currents play a role in redistributing global heat latitudinally. Let us study in detail about the sub tropical gyre as an example.

Subtropical Gyre : Each ocean basin has a large gyre located at approximately 30° North and South latitude in the subtropical regions. The currents in these gyres are driven by the atmospheric flow produced by the subtropical high pressure systems.

a.Western boundary currents: Flowing from the equator to high latitudes are the Western boundary currents. These warm water currents have specific names associated with their location: North Atlantic - Gulf Stream; North Pacific - Kuroshio; South Atlantic - Brazil; South Pacific - East Australia; and Indian Ocean - Agulhas. All of these currents are generally narrow, jet like flows that travel at speeds between 40 and 120 kilometers per day. Western boundary currents are the deepest ocean surface flows, usually extending 1000 meters below the ocean surface.

b. Eastern boundary currents: Flowing from high latitudes to the equator are the eastern boundary currents. These cold water currents also have specific names associated with their location: North Atlantic - Canary; North Pacific - California; South Atlantic - Benguela; South Pacific - Peru; and Indian Ocean - West Australia. All of these currents are generally broad, shallow moving flows that travel at speeds between 3 and 7 kilometers per day.



Map. No. 11.2 Ocean Gyres: 1. North Pacific 2. North Atlantic 3. South Pacific 4. South Atlantic and 5. Indian

c. East-west aligned currents: In the Northern Hemisphere, the east flowing North Pacific Current and North Atlantic Drift move the waters of western boundary currents to the starting points of the eastern boundary currents. In the Southern Hemisphere, the South Pacific Current, South Indian Current and South Atlantic Current move the waters of eastern boundary currents to the starting points of the western boundary currents.

Smaller gyres occur in the North Atlantic and Pacific Oceans centered at 50° North. Currents in these systems are propelled by the circulation produced by polar low pressure centers. In the Southern Hemisphere, these gyre systems do not develop because of the lack of constraining land masses.

B. Deep Ocean Currents: The world's oceans also have currents that flow beneath the surface. Deep ocean currents are driven by differences in the density of seawater. The density of seawater deviates in the oceans because of variations in temperature and salinity. At high latitudes, where the temperatures are cold enough to increase the density of the ocean water. These deep waters sink into the deep ocean basins and are referred as Deep Ocean Currents. These currents make up the other 90% of the ocean. Deep Ocean currents are less influenced by the Coriolis effect and generally travel at a much slower speed when compared to surface currents. Besides the landscape of the ocean floor, especially ridges and basins, impede the flow of deep-water currents. One complete circuit of this flow of seawater is estimated to take about 1,000 years.

III. Coral Reefs

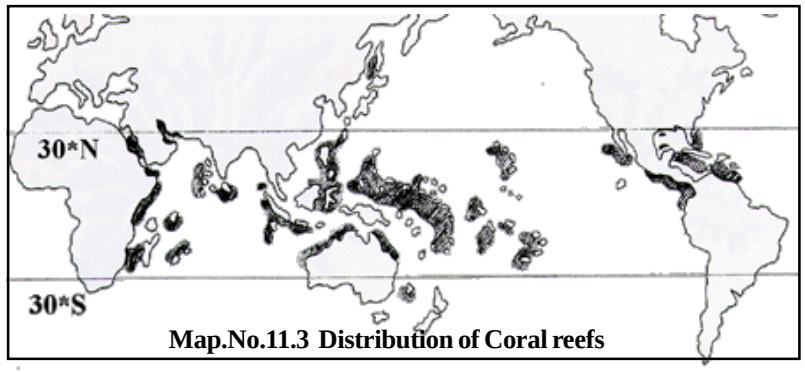
Recall the lesson we have studied in the six standard about the corals. A coral is a colony of many individual coral animals called polyps that are derived from replication of an original polyp. A coral reef is made of millions and millions of coral colonies plus other limestone depositing organisms, growing on and among the skeletons of their predecessors,

and the sands and silts derived from them. On the Great Barrier Reef, depending on where it grows, a reef can be either a ribbon reef on the continental shelf edge, a platform reef on the shelf, or a fringing reef along the continental islands and mainland.

Coral reefs thrive in clear tropical and semitropical ocean water. Most coral species require temperatures between 18 and 30 degrees Celsius. If the water temperature moves outside the range for long periods, the coral will be harmed, and the coral polyps might die.

Distribution of Corals: Various species of corals are found in all oceans of the world, from the tropics to the polar regions. Reef-building corals are scattered throughout the tropical and subtropical Western Atlantic and Indo-Pacific oceans, generally within 30 degrees N and 30 degrees S latitudes (Map.No.11.3).

a. **Western Atlantic reefs** include Bermuda, the Bahamas, the Caribbean Islands, Belize, Florida, and the Gulf of Mexico.
b. **The Indo-Pacific ocean region** extends from the Red Sea and the Persian Gulf through the Indian and Pacific oceans to the western coast of Panama. Corals grow on rocky outcrops in some areas of the Gulf of California.



Map.No.11.3 Distribution of Coral reefs

Importance of Coral reefs: Coral reefs are important in determining the amount of carbon dioxide in the atmosphere. The zooxanthellae

algae, through photosynthesis, remove carbon dioxide from the air and make carbohydrates available as food for both the zooxanthellae and the coral polyps. Eventually, much of the carbon removed from the air will reside on the ocean bottom in the form of limestone produced by coral polyps. However, both the coral polyps and the zooxanthellae must also use oxygen through the process of respiration (the same process humans use in breathing). Respiration releases carbon dioxide into the ocean and atmosphere. During the day when photosynthesis is occurring, more oxygen is produced by photosynthesis than carbon dioxide by respiration. At night, however, photosynthesis stops, and only respiration goes on. Most scientists believe coral reefs remove more carbon dioxide from the air than they add.

Earth's climate naturally changes. Currently, Earth's temperature appears to be increasing. Because coral reefs exist in a very narrow temperature range, these natural climate changes might affect their health.When ocean temperatures increase, coral bleaching (loss of zooxanthellae algae) occurs. The coral turn white and dies. Coral bleaching happens when the zooxanthellae algae are expelled from the coral polyps. The algae allow photosynthesis to occur and for the coral and other organisms to grow. When the algae go, the coral then take on a white color, or bleached appearance.

Sometimes, however, the delicate balance of nature is upset by human-caused events. Humans often influence events in the ocean. When fertilizer on the mainland runs off, it increases nutrients in the sea. Plants that thrive on nitrogen in the form of nitrates from the fertilizer then grow to the point that they can choke out other plants. This increased nutrients can lead to a decrease in biological diversity. For example, benthic algae are adjusted to high levels of nitrogen and grow at the expense of other organisms. This can lead to blocking the sunlight required by the zooxanthellae for photosynthesis. In addition to agricultural nutrient runoff there, municipal wastes, septic tank

seepage, and other sewage are added and provide more nutrients. Overfishing worsens the problem. Fish that would normally eat the algae are captured and killed. Obviously a large number of such events can destroy a reef in a relatively short time span.

Learning Outcomes

1. **Knew the about the ocean floor.**
2. **Understood the currents of the ocean.**
3. **Learnt about the Coral reefs.**

Points to Remember:

1. Humans have divided and named the interconnected oceans of the world into three groups: the Pacific, the Atlantic (including the Arctic Sea), and the Indian
2. The topography at the floor of the oceans are divided into three sections: 1.The Continental Shelf 2.The Continental Slope 3.The Ocean Trough
3. The movement of water in the ocean is referred as Currents. There are two types of currents. They are the Surface Current and Deep Ocean Currents.
4. Continental borders cause the currents to develop an almost closed circular pattern called a gyre. A typical gyre displays four types of joined currents: 1. two boundary currents oriented north-south and flowing parallel to the continental margins; and 2. two east-west aligned currents found respectively at the top and bottom ends of the gyre.
5. Flowing from the equator to high latitudes are the Western boundary currents. These currents are warm currents. Flowing from high latitudes to the equator are the eastern boundary currents. These are cold water currents.
6. In the Northern Hemisphere, the east flowing North Pacific Current and North Atlantic Drift move the waters of western boundary currents to the starting points of the eastern boundary currents.
7. In the Southern Hemisphere, the South Pacific Current, South Indian Current and South Atlantic Current move the waters of eastern boundary currents to the starting points of the western boundary currents.

8. A coral is a colony of many individual coral animals called polyps that are derived from replication of an original polyp. A coral reef is made of millions and millions of coral colonies plus other limestone depositing organisms, growing on and among the skeletons of their predecessors, and the sands and silts derived from them.
9. Reef-building corals are scattered throughout the tropical and subtropical Western Atlantic and Indo-Pacific oceans, generally within 30 degrees N and 30 degrees S latitudes.
10. Coral reefs are important in determining the amount of carbon dioxide in the atmosphere. The zooxanthellae algae, through photosynthesis, remove carbon dioxide from the air and make carbohydrates available as food for both the zooxanthellae and the coral polyps.

EXERCISES

I. Choose the correct answer:

1. The landmasses of Africa and Asia border the
   a) Indian ocean b)Pacific Ocean. c) Atlantic Ocean
2. The part of an ocean that lies close to the continental margin is
   a) Continental Slope b) Continental Shelf c) The Ocean Trough
3. In the atmosphere, Coral reefs are important in determining the amount of
   a) watervapour b) Oxygen c) carbon dioxide

II. Fill in the blanks

1. Continental borders cause the currents to develop an almost closed circular pattern called a ----------.
2. Flowing from high latitudes to the equator are the --------- boundary currents.
3. A coral is a colony of many individual coral animals called ----------.
4. Reef-building corals are scattered throughout the ---------- and ---------- oceans.

III. Match the following

1. North Atlantic	Kuroshio
2. North Pacific	East Australia
3. South Atlantic	Gulf Stream
4. South Pacific	Agulhas
5. Indian Ocean	Brazil
	Canaries

IV. Answer briefly

1. Differentiate the warm and cold current.
2. What are gyres?
3. Describe in brief about Continental shelf.
4. Write a brief note on Corals.
5. How are Deep water currents formed?

V. Explain in detail

1. Write an essay on ocean floor topography.
2. Describe in detail about the subtropical gyres.
3. What is a coral reef? Describe their distribution and importance.

ACTIVITIES

1. Prepare a chart showing the Gyres of the ocean.
2. Map the other gyres of the ocean like the one given below.

North Atlantic Ocean Gyre.

12. TYPOLOGY OF NATURAL DISASTERS

Learning Objectives

1. **Knows to distinguish between a hazard and a disaster.**
2. **Learns about types of natural disasters that occur in India**
3. **Understands the relief works for specific disasters.**

Many people have been fascinated by the spectacle of volcanic eruptions and terrified by the power of earthquakes and wondered about the importance of the fertile flood plains of the rivers, which have fostered human progress since the dawn of civilization. A volcanic eruption, an earthquake or a flood are some of the self regulatry systems through which our Earth maintain the natural balance. Such systems or events under certain circumstances, and many others as well, are destructive to human life and property.

I. DISTINCTION BETWEEN HAZARD AND DISASTER

Hazard and disaster are closely related. A hazard is a natural event while the disaster is its consequence. A hazard is a perceived natural event, which threatens both life and property. A disaster is the culmination of such hazard. A hazard becomes a disaster when it hits an area affecting the normal life system. For example, the 2001 Gujarat earthquake killed many people in Ahmedabad when buildings collapsed because of their poor constuction quality. In another earthquake of similar intensity in the USA during the same year, no one died as no building collapsed because of their better construction quality. The USA earthquake was considered a hazard. While the Gujarat earthquake was considered a disaster due to the severe loss of life and property.

Similarly, a hazard such as a cyclone hits an unpopulated coast, it need not be considered as a disaster. However, it will be considered a disaster, if life and property are seriously damaged.

For example in the Year 1999, when a cyclone hit the coast of Orissa, more than 15,000 villages have been flooded and more than 200,000 houses and over half a million cattle perished in the cyclone that swept through large parts of the state. Nearly two million houses were also destroyed in what is widely described as one of the worst cyclone, India has witnessed in the last century. Thus a hazard is a potential for a disaster. While hazards are inevitable, each hazard need not convert into a disaster.

Disaster is "an event concentrated in time and space in which a society or community undergoes severe damage and incurs such losses to its members and physical appurtenances that the social structure is disrupted and the fulfilment of all or some of the essential factors of the society is prevented." - UN Disaster Relief Office

Types of Disasters: There are several types of potential hazards which may lead into disasters. For a simple understanding it has been classified as follows or as shown in diagram 12.1.

1. Sudden onset hazards: Earthquakes, volcanic eruptions, landslides, floods, tropical cyclones and avalanche.
2. Slow onset hazards: Drought, famine, environmental degradation, pestinfestation and desertification.
3. Epidemics: Water/flood borne diseases, person to person diseases and vector-borne diseases
4. Industrial/Technological Accidents: system failures, fire, explosion and chemical leakage/spillage

Some of the disasters such as avalanches, snowstroms and tronodoes are of limited interest due to their restricted area extent. Avalanches are common in northern part of India.

Recently over 100 people were feared dead and 230 people were reported missing in the avalanche when it struck the south Kashmir district of Anantnag on 20, February. 2005. These areas are located on the Pirpanchal foothills and witnessed heavy snowfall for four days. The snow covered a vast area in the Kund belt of Kulgam police district and the avalanches and land slips almost buried the three hamlets.

GEOGRAPHICAL DISASTERS			
	NATURAL	HYDROLOGICAL	FLOOD DROUGHT
		METEOROLOGICAL	CYCLONE HURRICANE TORNADO SNOWSTROM
		GEOLOGICAL	LANDSLIDE EARTHQUAKE VOLCANIC ERUPTION TSUNAMIS
		BIOLOGICAL	EPIDEMICS CHOLERA; Etc.
	HUMAN MADE	WAR, CIVILWAR, COMMUNAL RIOTS, SERIAL BOMB BLAST, CHEMICAL, INDUSTRIAL AND NUCLEAR DISASTERS ACCIDENTS (Eg.) FIRE BREAKOUT. GAS LEAK	

Fig.No. 12.1 Classification of Disasters

II. DISASTERS IN INDIA

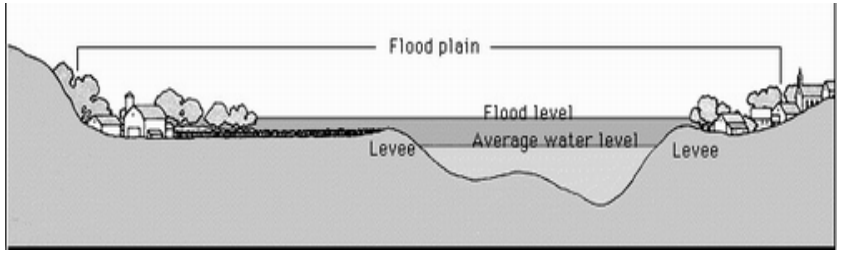
Due to unique and widely varying geographical and geological conditions of the country, virtually all types of natural disasters take place with various intensities and in different regions. Droughts, Floods, Cyclones and Earthquakes are major natural disasters in the country, though Landslides, Avalanche and Bushfire also occur in most of the states of India.

From1970 to 2002, India was affected by several disasters. During these 32 years, there were as many as 150 severe floods,18 earthquakes, 59 cyclones, 40 incidents of severe damage due to

high winds, 37 cases of severe epedimic outbreak and nearly 320 cases of major human made disasters excluding road accidents which claim nearly 75,000 lives annually. In the decade 1990-2000, an average of about 4,344 people have lost their lives and about 30 million people were affected by disasters every year in India. The recent tsunami waves that struck the south eastern coast of India on 26th December 2004, turned into India's biggest natural disaster.

1. **Floods**: Prolonged rainfall over several days in its drainage basin can cause a river or stream to overflow and flood the surrounding area. A flash flood from a broken dam or levee or after intense rainfall of 2.5cms. (or more) per hour often catches people unprepared.

In some areas levees or dams built to control flooding have actually made the condition worse. If a river's flow is slowed too much, the river bed begins to fill with silt, making it shallower and less able to carry the same volume of water. As a result, during times of heavy rainfall the river is unable to handle the added water and overruns its banks more quickly than it did before the levees and dams were built.



Many parts of the Indian region are subjected to some of the world's most intense rainfalls and floods during the monsoon season. In certain situations, topographic and meteorological factors locally enhance the magnitude of floods. The recent floods in Bihar, Assam and West Bengal have caused extensive losses in terms of human lives and property. This event once again

underscored the need for improvement of the scientific understanding of this most recurring, widespread, and disastrous natural hazard.

According to the estimates of the National Commission Publication on Floods, "as much as 40 million hectares of lands are prone to floods in the country". Most of the flood-prone areas lie on the Ganga and the Brahmaputra Basin. In these basin about 15.36 and 3.82 million hectares area is prone to floods respectively. Although floods occur with an unfailing regularity in some states, (Utter Pradesh, Bihar, West Bengal and Assam) the geographical area affected by floods does not remain constant every year, but varies considerably from year to year.

Types of floods in India : Floods of different types occur in India. These include the rainfall, rainstrom, coastal and dam-failure floods. Snowmelt floods are not very important in the Indian context.

Did you know?

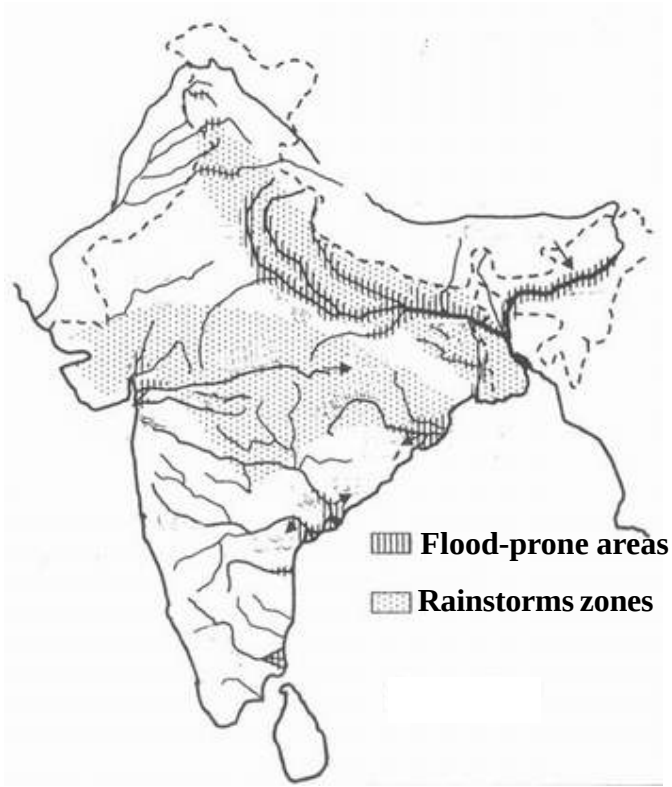
In India, the most flood prone areas are the Brahamaputra, Ganga and Meghana basins in the Indo-Gangetic-Brahmaputra plains in the north and northeast India. These rivers carry 60 percent of the nation's total river flow. The other flood - prone areas are: 1. the north west regions with the west flowing rivers namely, the Narmadha and Tapti; 2. Central India and the Deccan Plateau with the major east flowing rivers namely, Mahanadhi , Krishna, Godhavari and Cauvery.

Monsoon floods are the most frequent and result from heavy or intense precipitation in association with active to vigorous monsoon conditions for a number of days.

Cyclonic floods are connected with strom surges occur in some parts of the eastern coast of India and are produced by severe cyclonic storms originating over the Bay of Bengal.

Dam-failure floods are the most disastrous floods, and are usually the result of the failure or breaching of natural or human-made dams.

Much of the Indian population lives on riverine and coastal plains, which are often prone to floods. Hence, floods on these areas affect large numbers of people and their livelihood. Therefore, in such areas, an integrated disaster management approach is essential to minimize the loss of life, injury and loss or damage to property. Structural measures, including dams, levees, channel alteration and other protective works, are usually designed to provide protection against some specific level of flooding. But the lack of long, contiunuous and reliable hydrological records is a major constraint in estimating the minimum standard of protection. It is therefore, essential to improve, modernize, and expand the existing network, rainfall and stream gauging stations,



Major Flood - Prone Areas in India

DISASTER PREPAREDNESS MOVEMENT
DISASTER RISK MANAGEMENT PLANNING

FLOOD WARNING

- Take potable water, dry foods and baby foods to a safer place when flood warning is issued
- Hang valuable goods and records from the highest place in the house or pack in polythene bags and store them deeply under the ground
- Secure the cattles in an elevated place and store their fodder and potable water

- Listen to the local Radio/TV for instructions.

- Insure the house and domestic materials
- Cutoff all the electrical supply .

- Preserve the drinking water from the spreading of toxicity
- Cover the food items and preserve

- Avoid the snakes
- Avoid roaming around from the place of stay
- Keep the house and the surroundings clean
- Avoid eating spoiled foods
- As far as possible eat dry foods

For additional information

Joint Commissioner (Relief)/ State Planning Officer
Revenue Administration
Disaster Management And Disaster Mitigation Department
Chennai-600 005, Tamilnadu
Telephone No.: 28414550,28415551, 28410540

Developed by state resource centre, Chennai

and develop a comprehensive database. These are vital for flood management in the future. As flood hazards are inevitable and will continue to occur, it has been suggested that the flood vulnerability in India and other flood prone regions of the world, could be reduced by adopting more river-friendly schemes that are based on geomorphic principles and those that recognise the geomorphic importance and the environmental value of floods.

2. Drought: Drought is a creeping phenomenon, which makes an accurate prediction of its onset a difficult task. The factors promoting drought are the delay or less rain due to which there is water scarcity, depletion of forest, overgazing, soil erosion, extension of cultivation to marginal lands and lowering of water levels etc. directly contribute to and aggravate the ill effects of drought. Thus drought is defined as water deficiency with reference to normal water availability. It is an unfavorable deviation from the accepted norm of long-term average moisture residue between rainfall and evapotranspiration in a particular area.

The National Commission of Agriculture (1976) classified drought as meteorological, hydrological or agricultural. In a meteorological drought a significant (more than 25%) decrease in normal precipitation occurs over an area. When meteorological drought is prolonged it becomes a hydrological drought with marked depletion of surface water and subsequent drying of reservoirs, lakes and rivers, and decrease in ground water levels. Following hydrological drought, agricultural drought sets in when soil moisture and rain fall are inadequate for healthy crop growth, or even leads to total crop loss. In common parlance drought is an effect caused by deficiency in rainfall causing depletion of surface and underground water reserves below the required level. If rainfall deficit for the country as a whole is 10% below normal or worse, and 20% or more area of the country suffers from rain deficit during the monsoon season, it is termed as a “drought year” for the country as a whole. Hence, drought is primarily a

deficiency in rainfall but over exploitation of ground water aggravates the situation. Large evaporation resulting from poor water retention capacity of soil adds to the problem.

India has experienced four widespread major droughts after independence in the years: 1965-67, 1972-73,1979-80 and 1986-87; and thereafter one part or other is invariably affected every year. In 1979, India suffered from a widespread drought, which reduced the overall food grain production by as much as 20%. The drought of 1987, caused by the failure of the south-west monsoon over large parts of India, was one of the worst in this century. The overall deficency during the monsoon was (-) 19%.

Did you know?

Tamil Nadu should normally receive 979 mm of rainfall every year. Approximately 33% is from the southwest monsoon and 48 % is from the northeast monsoon. The annual rainfall distribution is as follows:

Table 1. Amount of rainfall during various seasons

Season	Months	Normal RF. mm.	% annual RF. mm.
Winter	January-February	47.28	4.83%
Summer	March-May	134.16	13.70%
	Monsoons		
Southwest	June-September	329.49	33.64%
Northeast	October-December	468.46	47.83%
Average rainfall		979.39	100%

Table 2. Distribution of annual Rainfall in mm.

Year	1999	2000	2001	2002	2003
RF in mm.	840.9	848	772.9	745.7	875.73

Tamil literature testifies to a famine on account of drought for 12 continuous years in Pandiyan kingdom during historical peruiod. For the last five years in succession the rainfall has been less than normal. In 2002 the lowest rainfall of 745.7 mm in the last 30 years was recorded. Because of severity and continuous drought the ground water levels had gone down. On an average for the state, the water table level went down by almost 1 meter. Chennai city faced its worst ever water shortage. Supply through lorries became the normal phenomenon.

Such an order of deficiency was recorded only in two earlier years of this century were in 1918 (-) 26% and 1972 (-) 25%. In the current decade also, large-scale intensive droughts have been observed in various parts of Bihar, Orisa, Andhra Pradesh Karnataka, Rajasthan and Tamil Nadu very frequently.

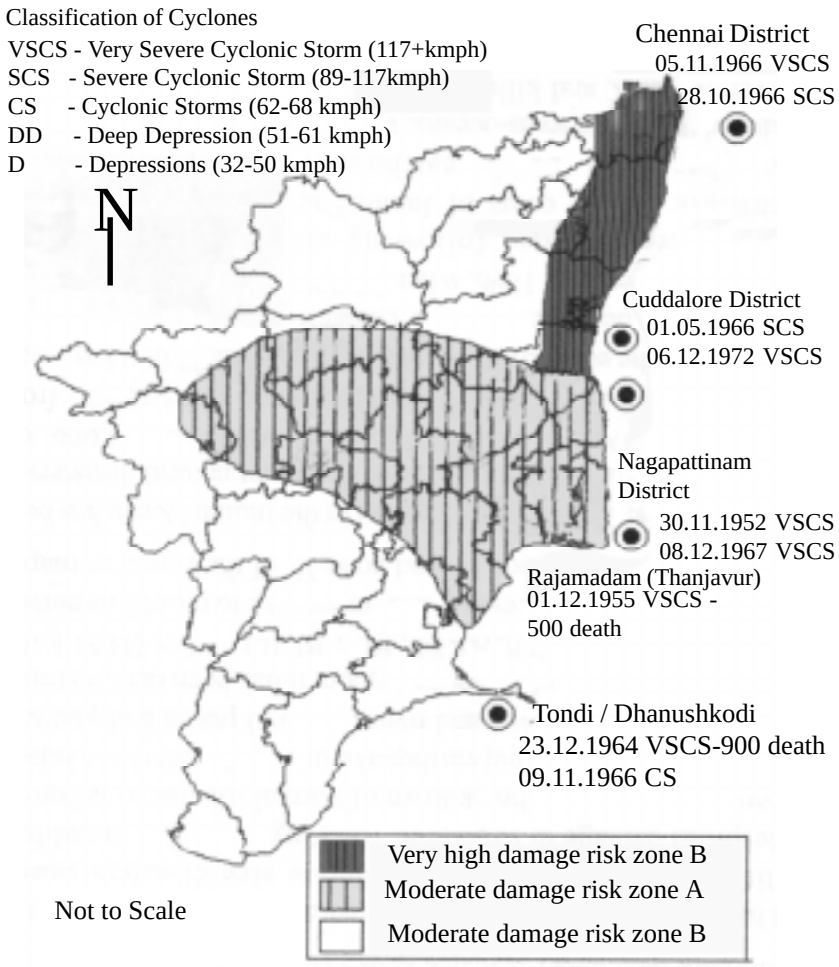
The state of Tamilnadu receives rainfall in both the southwest and northeast monsoon. Agriculture is more dependant on the northeast monsoon. Important crop seasons such as Samba, Thaladi and Navarai depend on the northeast monsoon. Hence, the rainfall during October to December plays an important role in deciding the fate of the agricultural economy of the state. Yet the entire Cauvery delta zone, an important agro-climatic zone depends primarily on the southwest monsoon.

3. Cyclone: India has a very long coastline of 5700kms, a major portion of which is exposed to tropical cyclones arising in the Bay of Bengal and Arabian Sea. The Indian coastal regions are among the six major cyclone-prone regions of the world. In India cyclones occur usually between April and May, and between October and December. These are called the Pre-monsoon and Post-monsoon. The eastern coastline of India, is more prone to cyclones as it hit by about 80% of total cyclones generated in the region. About 4 to 6 such storms originate in the Bay of Bengal and the Arabian Sea every year.

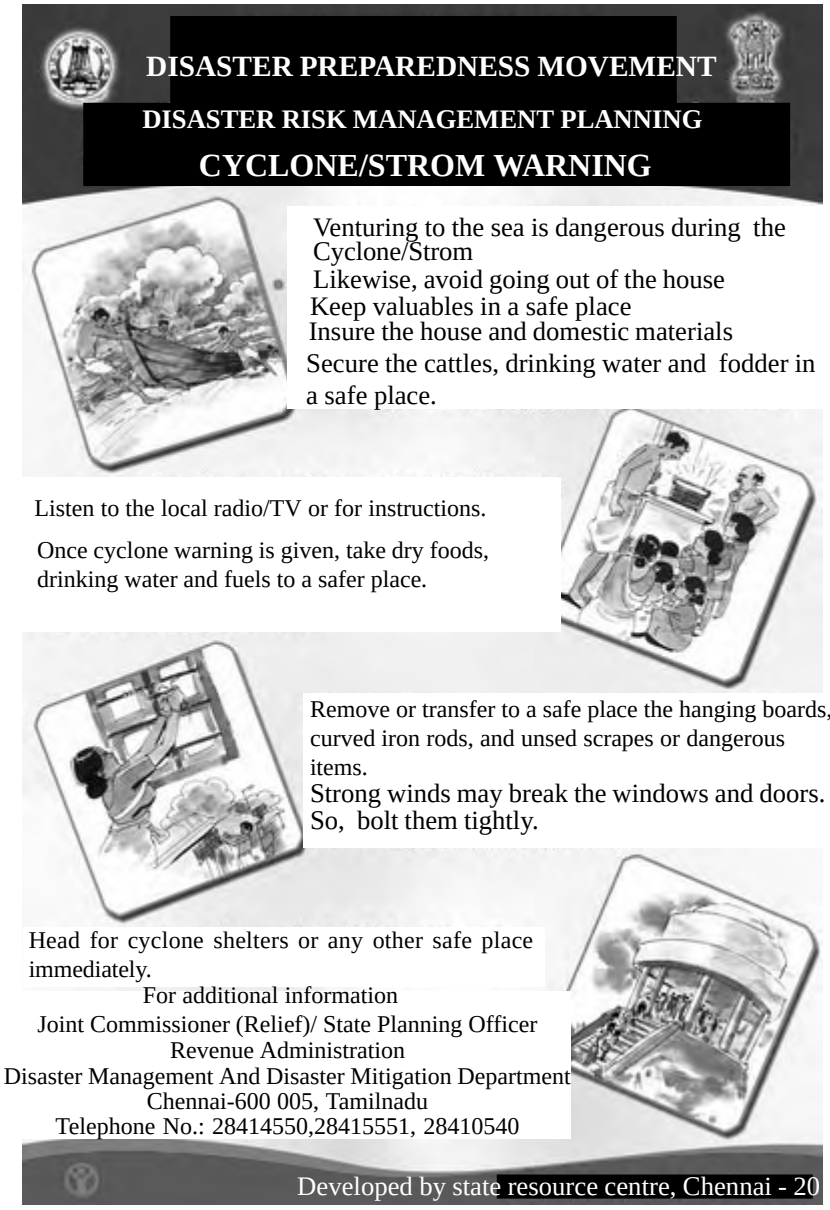
Did you know?

The devastating cyclone struck the Orissa coast of India near Paradip, on 29th Oct. 1999. It was termed as a super cyclone and paralyzed the entire state killing more than 9887 people. A huge surge of about 5 to 6 m. above the normal tide was experienced along with very heavy rains, penetrated the interior up to a distance of about 25km. from the coast.

TAMIL NADU WIND AND CYCLONE ZONES



Tropical cyclones are characterized by very strong winds, torrential rains and associated floods which cause extensive damage to human lives and property in the coastal areas. The damage from cyclones is mainly due to two factors. About 90% of the damage is due to inundation of land by sea-water and also the flooding of the river-deltas from the combined effects of sea



tides and surges entering into rivers. The balance10% of the damage is from the very strong winds generated by the moving cyclones. At present our science is not capable of controlling cyclones, but is capable of eliminating 90% of the damage and loss of life. The minimization of damages from strong winds can be ensured by designing buildings which have stronger roofs and by wind-proofing electric power-poles.

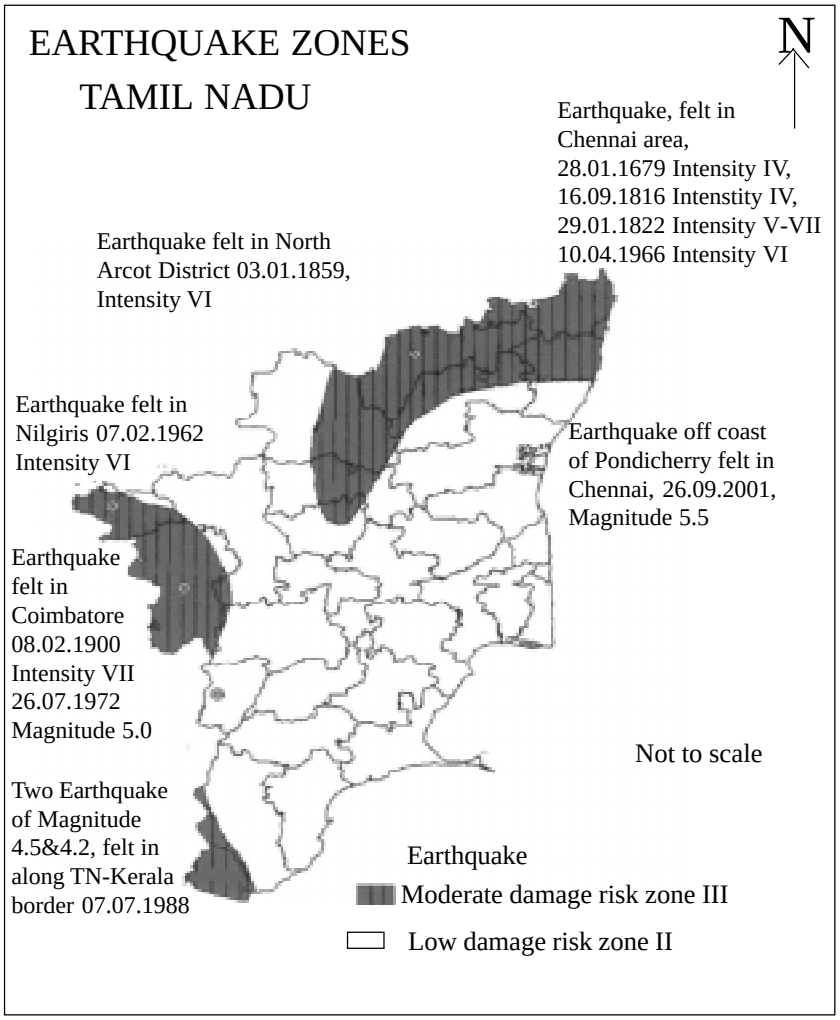
4. **Earthquake:** Earthquakes are considered to be one of the most dangerous and destructive natural hazards. Unlike other natural disasters such as, cyclones and floods, earthquakes occur with virtually no warning. While one can climb to higher ground during a flood, or install storm shutters before a cyclone, there is usually no advance warning or immediate preparation with earthquakes. The impact of this phenomenon is sudden with little or no warning, makng it just impossible to predict it. About 50-60% of total area of the country is vulnerable to seismic activity of varying damage potential.

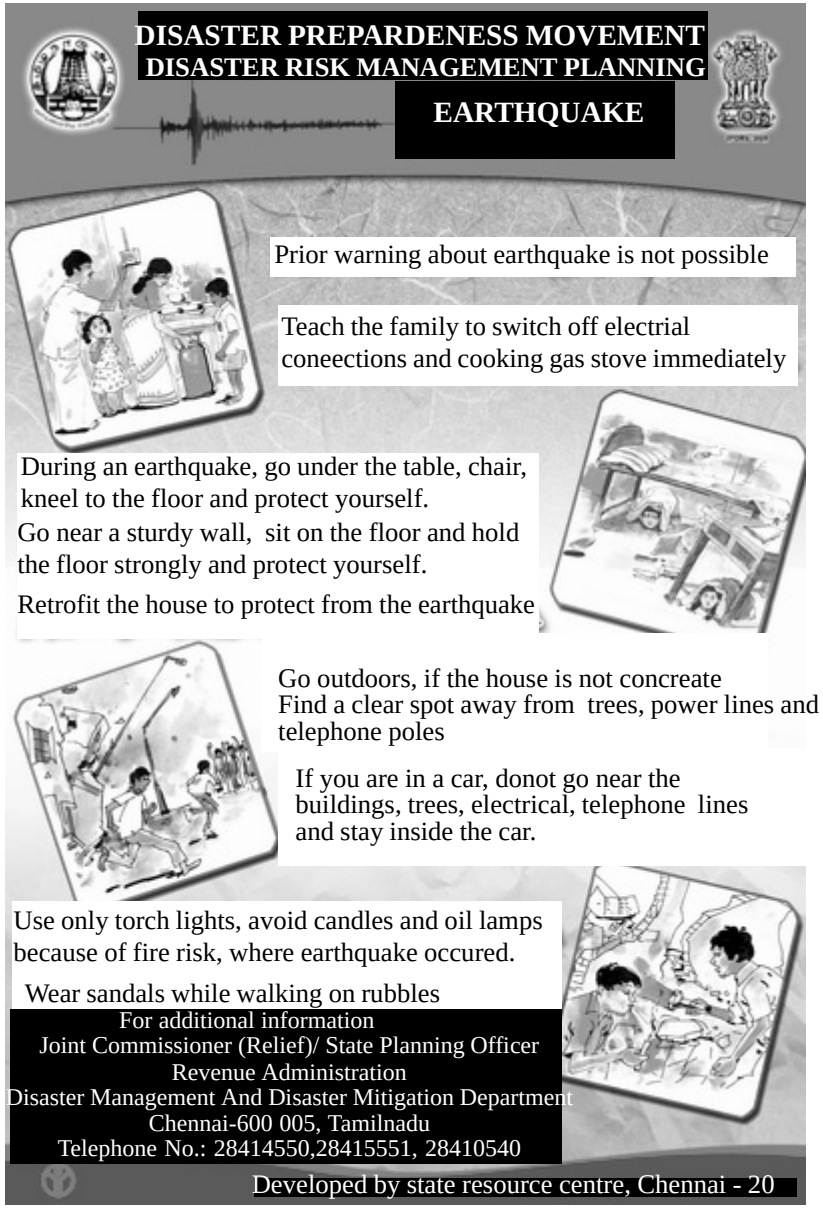
Seismic Zones of India : India is divided into four seismic zones, namely II,III, IV, and V; Zone V is the high risk zone. The Himalayas and the surrounding regions are situated in the Zone V and zone IV. In the same risk zone, lies the Rann of Kutch. A large part of the DeccanPlateau is made up of highly resistant rocks. Consequently, low seismic activity is found in this part of India. They are classified under Zone III (low risk Zone).

Tamilnadu is classified into moderate and low risk zones. The districts of Nilgiris, Coimbatore, Kanyakumari, Vellore, Thiruvallur and Chennai are classified as moderate risk Zone III. while about half of the area of Kanchipuram, Thiruvannamalai, Dharmapuri, Salem and parts of Thirunelveli are also under Zone III. The rest of the districts in Tamilnadu falls under low risk zones II.

The disasters related to to earthquakes have taken a heavy toll of life and property. Even a moderate size disasters causes widespread damage to structures, resulting in human casualities,

misery, chaos, and the breakdown of normal life due to failure of lifeline systems. The Bhuj earthquake of Jan. 26, 2001 in Gujarat took a toll of 13,811 lives and over 3,00,000 pucca and kuchcha houses were destroyed. Time and again, it has been demonstrated that **IT IS NOT EARTHQUAKES, BUT BUILDINGS THAT KILL PEOPLE.** Thus, it is necessary and imperative to retrofit





important buildings situated in zone IV and zone V of the zonation map.

5. Tsunamis: The December 26th 2004, earthquake produced the largest trans-oceanic tsunami in over 40 years, the wave is particularly notable for the extent of its reach, from Indonesia in the east, to the coast of Africa, some 7,000 km away. This massive tsunami lashed the Coromandel coast of India , inparticular the coastal districts of Tamil Nadu (Chennai, Thiruvallur, Kancheepuram, villupuram, Cuddalore, Nagapattinam, Thiruvarur, Thanjavur, Pudhukottai, Ramanathapuram, Tuticorin, Tirunelveli and Kanniyakumari) and killed at least 8000 dead and rendered many people homeless. Besides these waves destroyed many boats and nets worth millions of rupees.

The massive tsunami's impact in the Indian Ocean, with a death toll so far more than 100,000 all over the world will last for decades. The highest death toll from a tsunami until now happened in 1896, when 27,000 people were drowned following an earthquake off the coast of Japan. The Indian ocean tsunami killed more people than any tsunami in recorded history of the World. But, references are there in some of the tamil literatures about the tsunami like incidents that submerged the ancient ports namely, Poombhuhar and Kapadapuram.

Even though relief and rehabilitation is taking place in the coastal districts of Tamilnadu, the damage caused by seawater incursion to paddy and groundnut crops on thousands of acres has almost gone unnoticed. These agricultural lands are the backbone of the Cauvery delta regions. Similarly, the salt-manufacturing is the , a major economic activity of Vedaranyam in Nagapattinam district. Saltpans of more than 11,000 acres along the Vedaranyam coast have suffered extensive damage owing to inundation of seawater. Having lost the standing crops, the farmers main concern now was how to reclaim the saline land.

Important Facts to Know about Tsunamis: Tsunamis that strike coastal locations are always caused by earthquakes. These

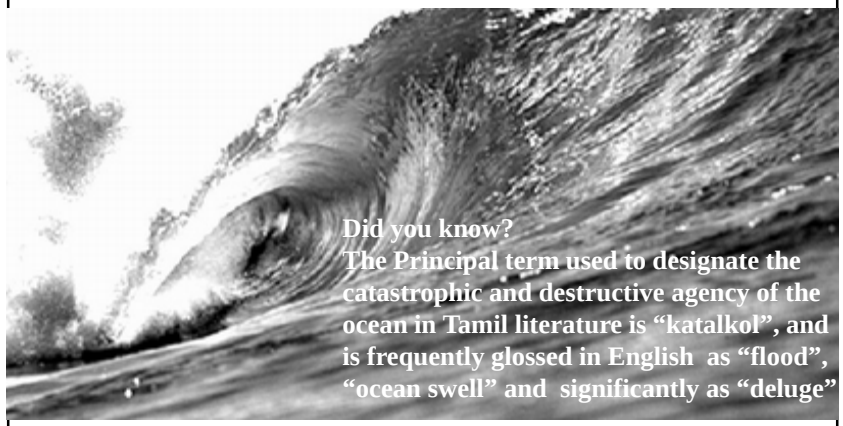
Did you know?

At 6.29 am. (IST) : Subduction of the India Plate under the Burma Plate caused earthquake with a magnitude of 9 on the Richter scale off the coast of Aceh Province on the Indonesian island of Sumatra.

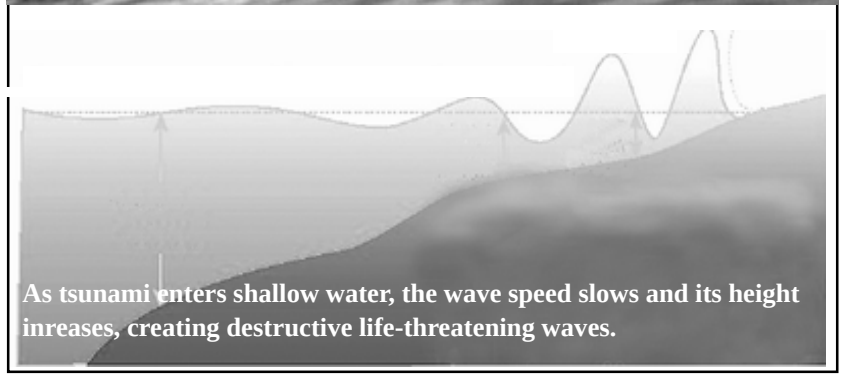
At 6.30 am. displacement of a part of the ocean floor forced the water upwards. A series of waves rushed outwards and raced across the surface towards the shoreline.

At 8.30am. Quake of 6.1 magnitude felt in the Anadamans. A series of gigantic waves called Tsunamis triggered in the Indian ocean and the speed of these waves near the point of orgin was 700km per hour with a height of about 1 m. As these waves left the deep water of the open ocean and reached the shallower water near the coast, the tsunami's speed diminished to 40km. per hour but gained a height of about 10m.

At 9am these waves crashed into the coastal areas of SriLanka and India. killing thousands of people. While Indonesia was worst-hit, India suffered massive damage in terms of lives and property.



Did you know?
The Principal term used to designate the catastrophic and destructive agency of the ocean in Tamil literature is "katalkol", and is frequently glossed in English as "flood", "ocean swell" and significantly as "deluge"



As tsunami enters shallow water, the wave speed slows and its height inreases, creating destructive life-threatening waves.

earthquakes might occur far away or near where you live. Some tsunamis can be very large. In coastal areas their height can be as great as 10 meters and they can move inland several hundred meters. All low-lying coastal areas can be struck by tsunamis. A tsunami consists of a series of waves. Often the first wave may not be the largest. The danger from a tsunami can last for several hours after the arrival of the first wave. Tsunamis can occur at any time, day or night. Tsunamis can travel up rivers and streams that lead to the ocean.

Tsunamis can move faster than a person can run. Sometimes a tsunami causes the water near the shore to recede, exposing the ocean floor. The force of some tsunamis is enormous. Large rocks weighing several tons along with boats and other debris can be moved inland hundreds of feet by tsunami wave activity. Homes and other buildings that are destroyed along with water move with great force and can kill or injure people.

Kanyakumari-Normal Water level

The Tsunami strikes at Kanyakumari

Sea water recede exposing the ocean floor - Kanyakumari

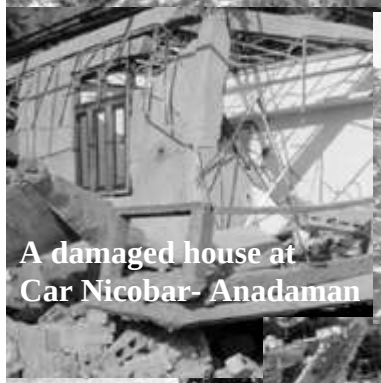
THE IMPACTS OF TSUNAMI

Nagapattinum -Aerial view Inundated by water

Impact at Cuddalore

Salt residue seen in fields

Crops affected by water



A damaged house at Car Nicobar- Anadaman

Dumping of debris at Kanyakumari

Floating cars in Chennai beach

Chennai -Aerial view of Marina

6. **Land Slides**: Landslides and other slope movements have attracted the attention of humans in the same way as other natural disasters which threaten their life or property. More often, the major landslides are combination of rockslide and rockfall. They all involve movement of mass (soil, debris or rock). The process of movement of mass may vary from slow soil creep to abrupt and sudden rockfall.

Unstable geological conditions, indiscriminate construction activity, exceptionally heavy rainfall, cloudbursts and flash floods- coupled with poor drainage due to urbanization, have been the main cause of most major landslides. High-speed mudflows and avalanches are known to occur quite frequently in the Himalayan region. Landslides are also very common in the Nilgiris.

Based on the general experiences with landslides, the rough estimates of loss in economy to India is of the order of Rs.250-300 crore/annum, for the country as a whole. Both developmental planning and land slide disaster manegement require landslide hazard zonation maps. Only then it would be possible to projrct damage scenarios, and carry out reliable risk analysis.

The most important lesson learnt is that landslides are among the serious and frequent disasters occuring in India. Besides, there are preferred sites where due to reasons of geology and climate, such disasters occur often. It is useful to identify such sites and prepare zonation maps. A community which has been hit by a landslide or any other disasters will need longterm rehabilitation process to make it safe from future catastrophes of this type.

So far we have learnt about the different types of natural disasters ocuuring in India. The variety of human made disasters is very vast indeed. Accidents on Road, Rail, in Air and over Water form a major group. Equally large number are the occurences of Fire of all types, Building collapse, stampede and ecological. Yet the most significant range emanates from Industrial and Technological disasters. Let us learn about the human made disaters in the follwing lesson.

Did you know?

Malpa Tragedy: The hamlets of village Malpa situated on the right bank of River Kali of the Kumaon Himalaya. The village was traditionally inhabited by tribal people, engaged in trade with Tibet for generations. With the opening of the Pligrimage route to Mansorove and Mount Kailash in China, The Malpa village began to bustle with human activity as base camp.

A rock avalanche of formidable consequence struck the hamlets in Malpa on the night between 17th and 18th August1998. A huge mass of rock got detached and hurtled down the slope and killed 210 people including 60 pligrims and the whole village was wiped out. This is a spectacular example of large scale devastation unleashed by landslides. Such tragedies often serve as live laboratories for the scienctists to learn from the events and mitigate future disasters.

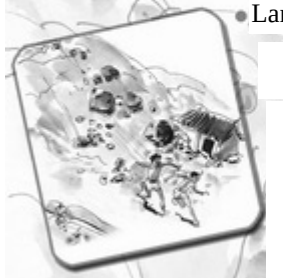
The Nilgiris: One of the valleys in the Nilgiris is called the Avalanch Valley. In this area, the majority of landslides occur in a loose cover of debris, mostly consisting of boulders. In December 1902, 53cm. of rain in Kothagiri(22 cm. on a single day) brought havoc. In October 1905, 17cm.of rain brought in its wake ' death and damage' in Coonoor through landslips.

Similarly, unprecedented rains in 1978 triggered about one hundred landslides, which caused severe damage to communication lines, tea gardens and other cultivated crops. Ninty people died and property worth Rs.15 crore was damaged. In recent times, casualities and damages due to landslides have increased in the Nilgiris.

DISASTER PREPARDENESS MOVEMENT

DISASTER RISK MANAGEMENT PLANNING

LAND SLIDE



- Landslide can strike quickly and without warning.

The sliding rock, stone and mud may destroy life and property

If houses are built in soil slide prone areas, preapre an alternative path for sliding soil to deviate

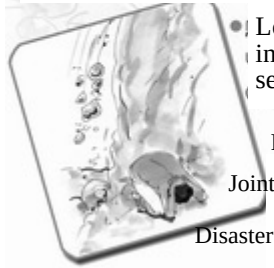
The warning signals of landslides are: the doors and windows get tightend. craks occur in the roof, walls, base, and built structure like roads

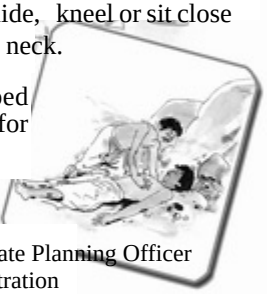
Chances are there for the closure of roads by mud slide, know two or three alternative planned routes to escape quickly.

If at home when landslide occurs, do not come out of the house

Take cover under a table, cot or other sturdy furniture

When there is no escape and trapped in a landslide, kneel or sit close to the floorand place your hands at back of the neck.





- Lookout for people trapped inside and give first aid for serious injuries

For additional information

Joint Commissioner (Relief)/ State Planning Officer
Revenue Administration
Disaster Management And Disaster Mitigation Department
Chennai-600 005, Tamilnadu
Telephone No.: 28414550,28415551, 28410540

Developed by state resource centre, Chennai - 20

Learning Outcomes:

1. **Understood the difference between a hazard and a disaster.**
2. **Knew about the types of natural disasters that occur in India.**
3. **Learnt about the relief works for specific disasters.**

Key Words and Definitions

Avalanche:	Rapid and sudden sliding of large mass of mixture of snow/ ice with rock material.
Cyclone:	A severe storm originating on the high sea and moving to the coastal areas, characterized by very strong winds, torrential rain and floods.
Drought :	Drought can be defined as prolonged, abnormally dry period when there is not enough water for meeting various users normal need.
Earthquake :	Earthquakes are a shaking or trembling of the Earth's crust caused by the release of huge stresses due to underground volcanic forces, the breaking of rock beneath the surface, or by sudden movement along an existing fault line.
Flash floods	Sudden but short lived torrential flood carrying an immense load of solid debris
Landslide:	Rapid movement of soil and rock downhill.
Tsunamis :	Tsunamis are called tidal waves which often affect distant shores which originates from under sea or coastal seismic activity, landslides . volcanic eruptions and meteorites.
Volcanoe :	A volcano is a vent or chimney to the earth surface from a reservoir of molten rock called magma.

EXERCISES

I. Choose the correct answer:

1. A sudden on set hazard is
   a) fire b) drought c) earthquake
2. In India, cyclones occur usually between April and May, are called
   a)the Pre-monsoon b) post-monsoons c) the tropical
3. The districts of Nilgiris, Vellore, Thruvallur and Chennai are classified as
   a) high risk b) moderate risk c) low risk

II. Fill in the blanks

1. Avalanches are common in ---------- part of India.
2. Dam-failure floods are the most ---------- floods
3. Tamilnadu is classified into ---------- and low risk zones.
4. A flash flood from a ---------- often catches people unprepared.
5. Not ---------- but buildings that kill people.

III. Match the following

1.	Slow onset	Earthquake zone III
2.	26th December 2004	Slope movement
3.	Gujarat Earthquake	Tsunami
4.	Land slide	26, January 2001
5.	Chennai	Drought

IV. Answer briefly

1. Differentiate the terms hazard and disasters.
2. What do you understand by industrial disaster?
3. List the seismic zones of Tamilnadu.
4. Write a brief note on drought years
5. What are landslides?

V. Explain in detail

1. Classify the type of disasters.
2. Write an essay on any one of the natural disasters.

ACTIVITIES

I. Map the follwing
   1. Earthquake zones
   2. Wind and Cyclone zone
2. Discuss and dramatise the relief measures of natural disasters.

13. TYPOLOGY OF HUMAN - MADE DISASTERS

Learning Objectives

1. **Learns about the human-made disasters.**
2. **Knows about the Disaster Cycle.**
3. **Understands the management strategies**

After the industrial revolution the science and technology improved the standard of living but destroyed the harmonious relationship between the humans and the natural environment. Environmentalists fear that as technology advances, human influence on our environment will also increase, both in intensity and extent. Our power over our environment will become more dominant In the this lesson, let us learn about human-made disasters and their impacts.

1. Fire: One of the most shocking and painful incidents of recent years was the fire tragedy in a school at Kumbakonam on the forenoon of 16 th July, 2004. The tragedy occured because one of the classrooms had a roof made of thatch. When this thatch caught fire and fell on the children, they got trapped under the flames and could not escape. The tragedy resulted in the death of 94 children and left many others with disfigured faces and serious scars. The best tribute we can pay to the children who died in this incident is to ensure that such a tragedy does not occur ever again. Such fire accidents and forest fires are very destructive disasters and are almost always humanmade. While there are distinct features of each fire event depending on the nature of the burning material (coal, gas, oil, building, forest etc.), location (crowded area, multi-storeyed building, village, hamlets, forests,etc.), weather conditions (hot, dry, strong winds); the common result is loss of life and property and misery for the

surviving victims. Multi-storeyed buildings, clusters of settlement and large congregations such as marriage and religious gatherings, where there is abundance of thatched or tended housing and where there is fire kindled for cooking or fireworks, etc., are specially vulnerable to fires. Electrical short-circuiting, sparks from loose connections, and burning cigarette and beedi pieces are very common causes of starting fires. Needless to say, fires also pollute the atmosphere.

Location, Frequency and Intensity: As regards location, no place is free from the hazards of fire but the risk is more in congested areas, badly arranged stores, near combustible or inflammable material, badly maintained electric installations, multi-storeyed buildings, coal mines, forests and in locations with hot and dry climate over long periods of time.

There is no inherent frequency in the occurrence of fires or forest fires but it is clear that ignorance, carelessness, negligence, and bad maintenance add very considerably to the possibility of occurrence of fire disasters. Complete or reliable data for the entire country are not available but it has been estimated that about 30 lakh fire incidents occur in India annually resulting in about 15,000 deaths every year. These figures appear unbelievable but these are reasonably correct estimates.

In the context of fire, prevention is definitely better than protection. But if a fire does happen, protection becomes most important. Protection from fire consists essentially of detection of the fire as early as possible and extinguishing it as soon as possible. Thus safeguarding life and property from fire and forest fire involes three basic aspects, which are: 1. Prevention 2. Detection and 3. Extinguishing. Public awareness of what to do before fire, during fire and after fire is of critical importance. Municipalities and Government Departments make Bye-laws and Building Codes to guard against fires. But vast rural areas are not covered by these rules.

2. Industrial and Technological disasters: These disasters result from accidents,failures,mishap or misuse of some kind of technology.

a. **The Industrial Hazards**: The storage and transportation of various hazardous materials used in industries like manufacturing, power production etc. may result in industrial hazard accidents. Recently, major dissaster threats have emerged in the chemical and nuclear industries. Chemicals are a natural and important part of our environment. Even though we often don't think about it, we use chemicals every day. Chemicals help us keep our food fresh and our bodies clean. They help our plants to grow and fuel our cars. And chemicals make it possible for us to live longer, healthier lives. But, under certain conditions, chemicals can be poisonous or have a harmful effect on your health. Some chemicals that are safe, and even helpful in small amounts, can be harmful in larger quantities or under certain conditions. Thus, chemical industry faces multiple risks involved with its production, transportation,storage,usage and disposing off the effluents containing residual chemicals.

The history of nuclear industrial development is about half a century old. Initially, the nuclear power industry was developed as an alternative, to offer a relatively dependable and inexpensive source of energy. But after a few accidents in this industry like Chernobyl (former USSR), this industry is also considered to be the most hazardous one. Majority of developing countries

Did you know?

December 2,1984, was a routine day at the UCIL, factory turned into a major disasterous day at Bhopal.

One of the most disastrous events since the history of chemical industry occured in Bhopal,the capital city of Madhya Pradesh, on the night of December 02,1984 in the factory of Union Carbide of India Ltd. due to leakage of Methyl Iso Cynate (MIC) gas. MIC was strored in the underground tanks, which became contaminated with water. The contamination produced chemical reaction, followed by a rise in gas pressure and a subsequent leak.

Dec 2nd:	9.30 p.m.: Routine maintenance operation started.
	10-11pm: Became aware of a leak and a casual attempt was made to trace the source of leakage. Leak continued.
Dec.3rd	12.15 - 12.30 A.M. The pressure in MIC tank reached maximum and temperature increased to 200 deg. celcius. The roof of the tank cracked and valve of the tank gave away and large quantities of MIC gas leaked into the atmosphere. The workers of the factory realised the risk of a massive disaster.
	1A.M.: After failure of the safety systems, nothing could be done to stop the leak and the workers at the plant fled. About thousands of people living around the plant were awakened by suffocating, burning effects of the gas. As on three sides, the UCIL plant was surrounded by slums and other poor settlements, the people living in these colonies were the worst sufferers. There was no warning systems or guidance to the general public around this time.
	2.30 A.M.: A large number of people were rushing out of the town through the highways leaving Bhopal. The mad rush oon the main roads of the city resulted in stampedes. About two lakh people had fled the city by 3.30 p.m.
	4.00 A.M. Hospitals were crowded with suffering people. In the wake of the tragic disaster, a large number of people lost their lives and received injuries,many to their lungs and eyes. According to the government reports,1754 persons had died and 200,000 were injured.

including India are using nuclear power increasingly to get rid of continuously increasing need of imported source of energy.

b. Transportation Accident: Transportation is very much involved in industrial and technological activity. Therefore,

transportation accidents constitute a special category of industrial and technological disasters. The accidents in various modes of tranport like highways, waterways, railways, and airways could occur at any time and any place, and often involve multiple injuries and/or deaths. The innovation in the safety systems have reduced the chances of occurrences of disasters considerably. But on the otherside, the number of deaths in the transpotation sector are on the rise due to increased number of travellers and enhanced travelling distances.

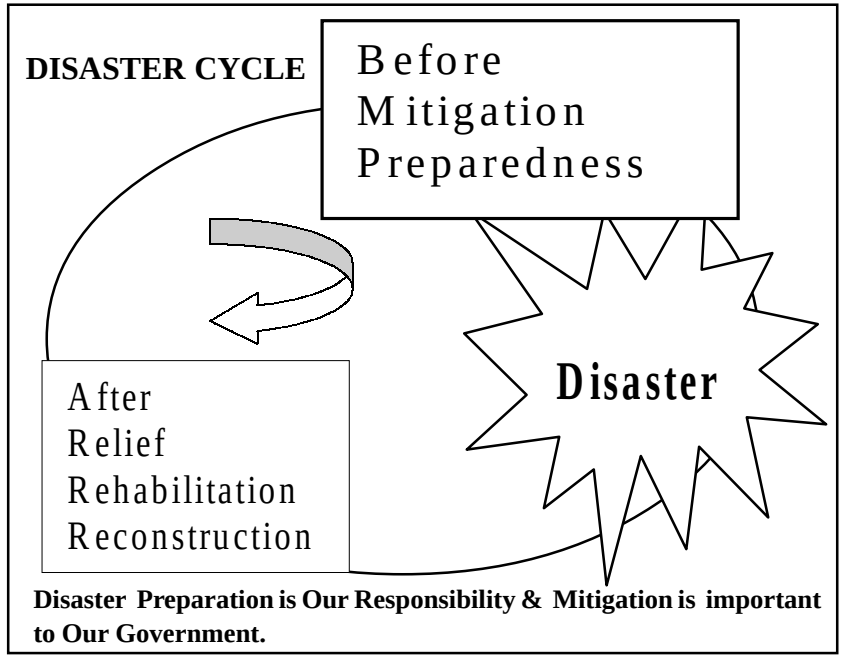
The colossal loss of life and property and the social and economic disruptions caused by natural disasters have become a great concern. The recent attack of tsunamis on the coastal districts of India and other parts of the world calls for a nation-wide response mechanism, where in there should be a pre-set assignment of roles and functions for various institutions at the central, state, and district levels, to cater to various management requirements before and after a disaster. In crisis situations, a quick rescue and relief measure is imperative. However, considerable damage can be minimized if adequate levels of preparedness are achived. Indeed, as and when attention was given to adequate prepardness, the loss of life and property was considerably lower.

DISASTER MANAGEMENT STRATEGIES

Disaster management suggests that the similar management strategies can be applied to all disasters. Disasters do not just appear one day, rather they exist throughout time and have a life cycle of occurrence, and hence the management strategy should match the phases of a disaster in order to mitigate, prepare, respond and recover from its effect. There are four phases in Disaster Management: Mitigation Preparedness, Response and Recovery. The four phases are visualized as having a circular relationship to each other (Disaster Management Cycle). The activities in one phase may overlap those in the previous one.

1. Mitigation: Disaster mitigation includes all possible actions to reduce the impact of a disaster that can be taken prior to its

occurrence, including preparedness and long term risk reduction measures. For effective mitigation measures, knowledge of the disaster, history of the place, its vulnerability to types of hazards and elements, which are at risk, is important. Thus Disaster mitigation is defined as "All actions to reduce the impact of a disaster that canbe taken prior to its occurrence, including preparednees and long term risk reduction measures". It also includes the planning and implementation of measures to reduce



the risks of man-made hazards,and the process of planning for effective responce to disasters, which do occur. Disaster mitigation is important because basically it is to prevent or minimise loss of life, property and infratructure from disaster.

2. Preparedness: Disasters can happen anywhere in the world. Every day some part of the country is affected by one or more of the following emergencies: Cyclones, Earthquakes, Volcanoes, Floods, Land slide, Drought, Toxic Spills and Fires etc. We can

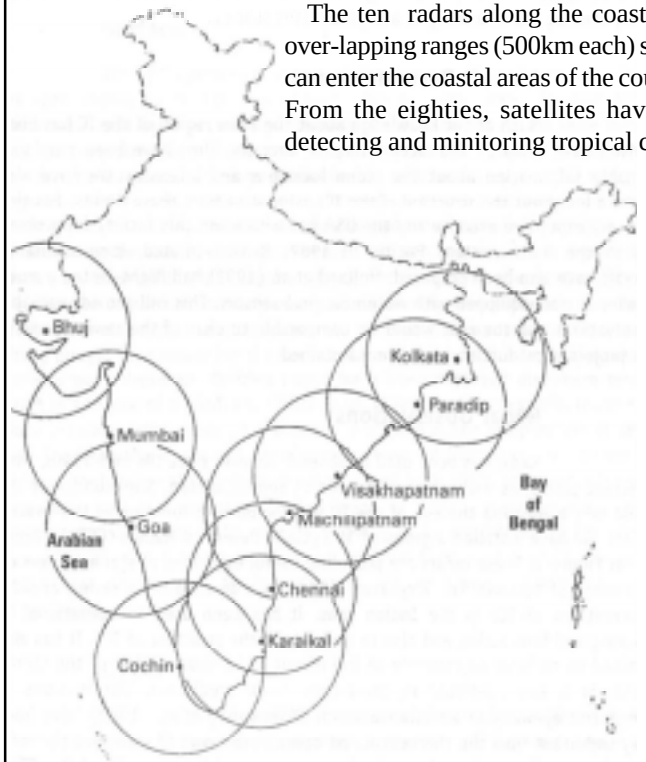
be prepared for floods, droughts or even for an earthquake. Both people and government should be ready all the time, because disasters don't rest. So, preparing for a disaster that is most likely to happen in your area will help you, be prepared for any disaster. Remember anything can happen at any time.

3. Relief: Relief measure are the immediate need in the post disaster scennario, especially when infinite victims are affected and their locations are not clearly known. In such type of circumstances, search , rescue and evacuation processes are carried out immediately after the disasteer has struck a certain area or zone. These are the most important operations, which are usually peerformed by the local volunteers,voluntry organizations, and the district and state agencies. If the condition worsens and these groups are not able to control the situation then the defence services are also called into help.

Did You know?

The Cyclone Detection Radars set up by Indian Meteorological Department (IMD) covers the entire coastal belt. According to IMD, cyclone warnings are issued in two stages. The first stage warning is known as **"Cyclone Alert",** issued 48 hours in advance of the expected commencement of adverse weather over the coastal areas. The second stage warning known as **Cyclone Warning** is issued 24 hours in advance.

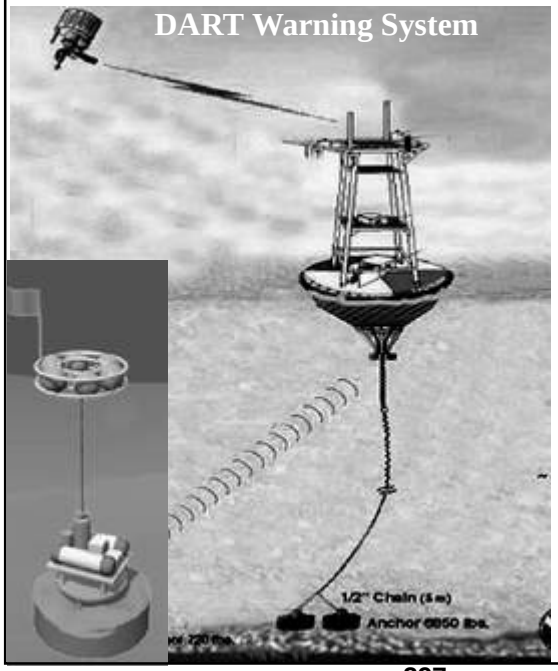
The ten radars along the coast are placed with over-lapping ranges (500km each) so that no cyclone can enter the coastal areas of the country undetected. From the eighties, satellites have been used for detecting and minitoring tropical cyclones.



4. Reconstruction and Rehabilitation: Post-disaster reconstruction and rehabilitation is not merely a disaster management activity. It should also be considered as development activity. It highlights the interconnection between disaster management and development activities and discusses the ways and means through which rehabilitation work can be incorporated

Did You know?

The new system in development is the **Deep-ocean Assessment and Reporting of Tsunamis system (DART).** Each DART station is comprised of two main components- **Bottom Pressure Recorder (BPR)** & **Surface Buoy**



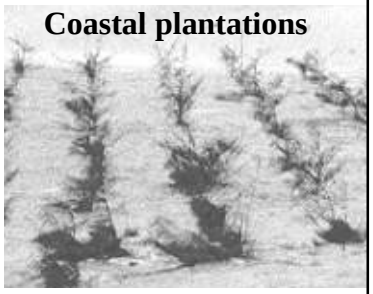
•BPR is the heart of the system and resides on the sea floor during its deployment

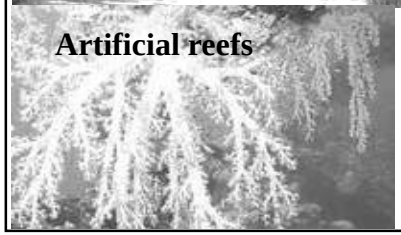
•It consists of a pressure gauge programmed with a sampling scheme that yields a full ocean depth resolution of approximately 0.25 millimeters (mm) of water

•Surface buoy is used to transfer information from the BPR to the Tsunami Warning Centers via a **Geo-stationary Operational Environmental Satellite (GOES)** transmitter.

as part of development planning concerned with housing, repair and strengthening of buildings, infrastructure development and other forms of social and economic rehabilitation in disaster affected areas. But the severity of the impact of each disaster is dependent on the existing socio-economic conditions of the affected community.

Did you know?
Protection against tsunami can be done by following either of the two options are: a. **Hard options – Expensive Eg. Seawalls, artificial reefs**





– Better scientific understanding and prediction
– Redefined coastal regulations
– Hazard mapping

Among various requirements of disaster management, planning and communication are very important essential tools to deal with disasters. Proper planning ensures that damages from disasters are considerably reduced in the long term. It also prepares people and officials to cope better in disaster situations.

In fact, the misery of the affected people is usually increased by aggravating factors such as poverty, population growth, rapid urbanization, transition in cultural practices, environmental degradation and lack of awarness and information. While many disasters are either caused or aggravated by environmental degradation, lack of awareness and proper information usually converts a hazard into a disaster. Deforestation leads to rapid rain runoff, which also contributes to soil erosion and flooding. In most

disaster prone societies, although there is a traditional wealth of understanding about disaster threats and responses, yet they rarely know what specific steps they should take to immediately to escape the crisis.

Learning Outcomes

1. **Learnt about the human-made disasters.**
2. **Knew about the Disaster Cycle.**
3. **Understood the management strategies**

Key words and definitions

Accidents:	Road, Rail, Sea and Building collapse.
Industrial Mishaps:	Gas leak, Explosion, Sabotage, Safety
Disaster Prevention:	Mostly applicable to human-made disasters, where preventive measures can possibly be taken to stop disaster possibilities.
Disaster mitigation	All measures to reduce the impact of the disaster
Disaster prepardness	All actions taken to reduce the risk of a hazard before the disaster as well as to provide effective relief after the disaster.
Damage assessment:	Post disaster estimation of physical damage.
Disaster assistance:	Provision of measures to prevent and reduce the impact of, and reverse the effects of disasters; phase include relief, rehabilitation, reconstruction and preparedness, and prevention and mitigation.

EXERCISES

I. Choose the correct answer:

1. Fire accidents and forest fires are almost always
   a) Human-made b) Natural c) Science and Tecnology
2. Under certain conditions, chemicals can be
   a) Poisonous b) Harmful c) Useful
3. Industrial and technological activity is very much involved in
   a) Transportation b) Industrial c) Agricultural

II. Fill in the blanks:

1. In the context of fire, ---------- is definitely better than protection.
2. The innovation in the ---------- systems have reduced the chances of occurrences of dissters considerably.
3. Proper -------- ensures that damages from disasters are considerably reduced in the long term.
4. In crisis situations, a quick rescue and relief measure is ----------.

III. Match the following

1. 16 th July, 2004	multiple risks
2. Chernobyl	soil erosion and flooding
3. Chemical industry	former USSR
4. Deforestation	atmospheric pollution
5. Fires	Kumbakonam fire accident

IV. Answer briefly

1. What are human-made disasters?
2. Write a brief note on mitigation
3. Write an account about the industrial hazard.
4. Describe relief and rehabilitation.

V. Explain in detail

1. Describe disaster cycle with illustration.
2. Write a note on 'Fire location, frequency and intensity"

ACTIVITIES

Be Prepared-Disaster can strike quickly and without warning. It can force you to evacuate your neighborhood or confine you to your home.

1. Create a Disaster Plan

- Meet with your friends and family and discuss why you need to prepare for disaster. Explain the dangers of fire, cyclonic weather and earthquakes to children. Plan to share responsibilities and work together as a team.
- Discuss the types of disasters that are most likely to happen. Explain what to do in each case.
- Ask an out-of-state friend to be your "family contact." After a disaster, it's often easier to call long distance. Other family members should call this person and tell them where they are. Everyone must know your contact's phone number.
- Discuss what to do in an evacuation.

2. Prepare a Disaster Supplies Kit for Home

1. First-aid kit and essential medications, Canned food and an opener. Some water bottles of water for at least 3 days; often more is needed. Protective clothing, rainwear, and bedding or sleeping bags
2. Battery-powered radio, flashlight and extra batteries.
3. Special items for infants, elderly or disabled family members.
4. Written instructions for how to turn off gas and water if authorities advise you to do so. Keep essentials, such as a flashlight and sturdy shoes, by your bedside.