

Department of Geography (PG Department), Patna University

MA Semester II (2019-21)

Paper CC-8 (Geography of India)

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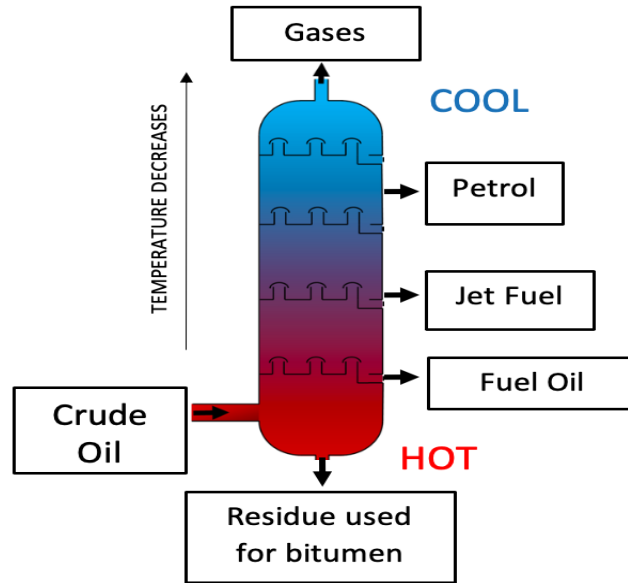
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Sources of Energy – Petroleum

- Energy – Energy is the prime mover of the economic growth and is vital to the sustenance of a modern economy. Energy is the to the improve and drive the life cycle. It is the gift of the nature to the mankind in different forms and its consumption is directly related to the progress of the mankind. Post industrialization the requirements and standard of living of humanity has increased and this has increased the demand of the energy globally. India is one of the largest and fastest growing economies in the world. India has demand of energy which is currently satisfied by non renewable source of energy (coal, petroleum and gases). The more the developed is the country, highest is the per capita of energy consumption and vice – versa.

Petroleum - The word petroleum derived from the two Latin words i.e. Petra (meaning rock) and Oleum (oil). Petroleum is a fossil fuel (means it has formed by the decomposition of organic matter over the millions of year ago). Raw petroleum or crude oil is a oily liquid. It is extracted from Earth's crust through huge deep oil well. The petroleum is obtained from the rocks (sedimentary rocks) of the Earth.

Petroleum is a complex mixture. Petroleum need to refine and the separation of various components of petroleum is done at the oil refineries and this separation is called Fractional Distillation (separation of chemical components by their boiling points).



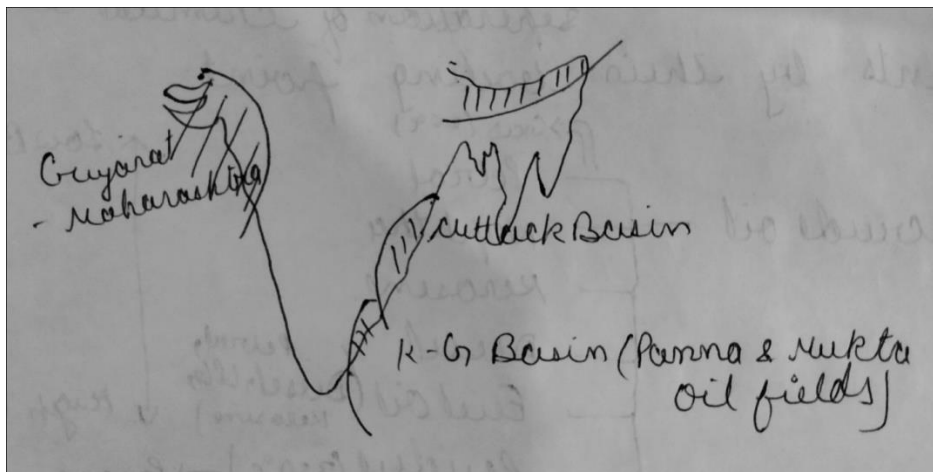
Fractional Distillation Process

Origin and Occurrence of Petroleum in India:

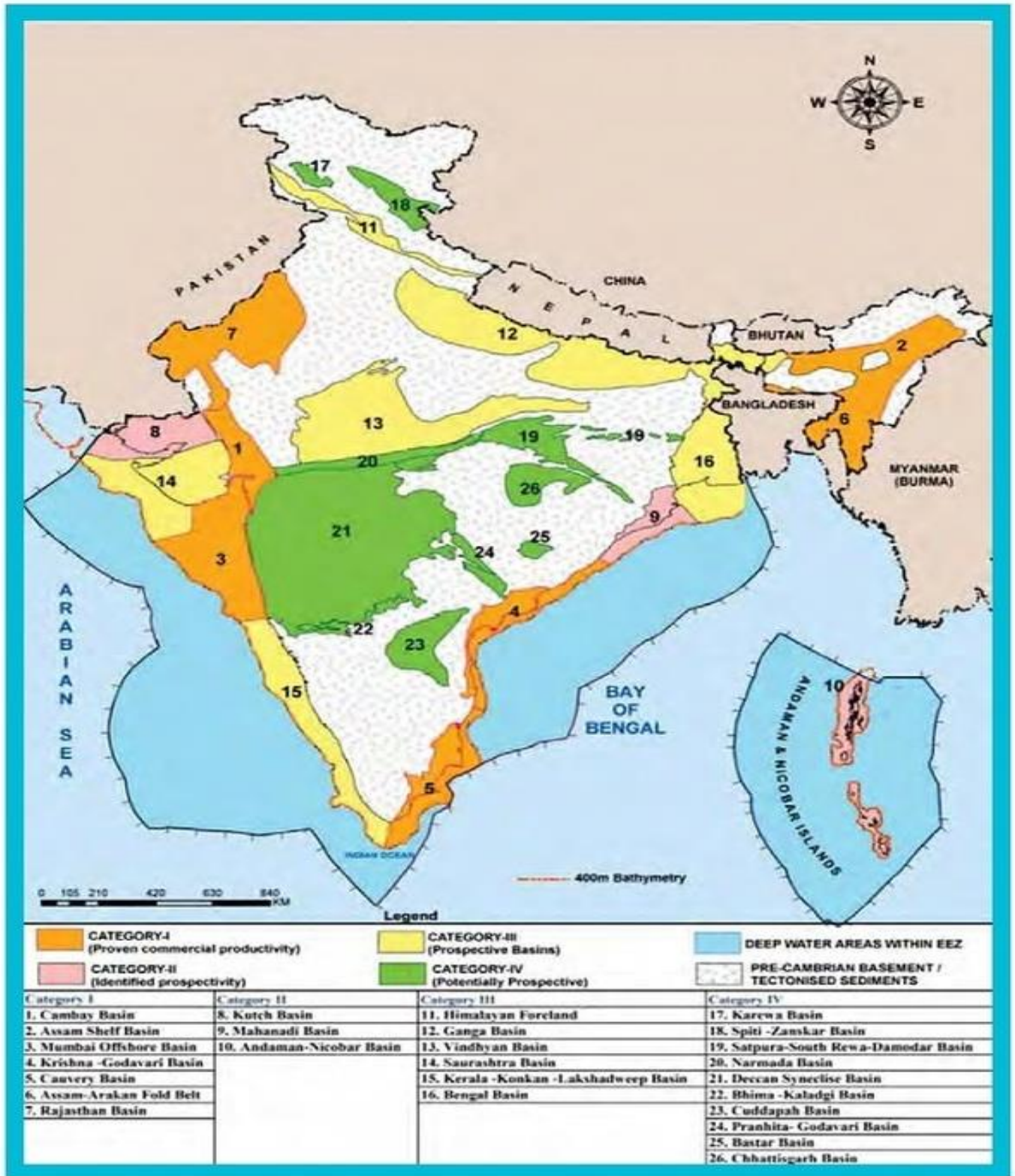
Petroleum is organic in nature found in the sedimentary basins, depressions. In India, most of the oil reserves are found in the fault traps of sedimentary rocks during the tertiary periods. Petroleum is formed by the remains of plants and animals which are buried underneath or settled down at the bottom of the water bodies.

Plateaus also witnessed marine transgression along or near its coast which became responsible for oil and the gas reserves of India.

INDIA: Figure showing marine transgression in India



INDIA: Sedimentary Basins of India



India has **26 Sedimentary Basins** have an area of approximately 3.14 million Sq. Kms.

These are classified in **4 categories** :-

Category 1- **Basins with established commercial production.** These are:

- Bombay high
- Rajasthan
- Krishna Godavari
- Cauvery
- Assam

Category 2 - **Basins with known accumulation of hydrocarbons but no. commercial production achieved so far.** These are

- Kutch
- Mahanadi-NEC (North East Coast) Basin
- Andaman-Nicobar
- Kerala-Konkan-Lakshadweep Basin.

Category 3 - **Basins having uncertain potential which may be prospective by analogy with similar basins.** These are:

- Himalayan Foreland Basin
- Ganga Basin
- Vindhyan basin
- Saurashtra Basin
- Kerala Konkan Basin

Category 4 -**Basins having uncertain potential which may be prospective by analogy with similar basins in the world.** These are:

- Karewa basin
- Satpura –South Rewa–Damodar basin
- Narmada basin
- Deccan
- Pranhita Godavari basin
- Cuddapah basin.

Distribution of petroleum in India

In India, petroleum was, first of all, got known during the construction of railway tracks in Assam. The first oil well was dug near Naharpung in 1866 but no oil was obtained there. The first region where oil was obtained was Makum, in the year 1867. Subsequently, an oil refinery was established near Marhherita in 1889. After more exploration, oil was also discovered in Digboi in 1889.

Before 1960, petroleum oil was produced only in Assam. In 1960, for the very first time, an oil well was dug out of Assam state, in Ankaleshwar area in the state of Gujarat. The oil well was named as Vasudhara. India's first offshore oil mining was done on Aliabet, an island 45km away from Bhavnagar in Gujarat, in the Gulf of Khambat. In 1975, oil was discovered in Bombay High and in the subsequent year, production was started.

Distribution in the state of Assam

1. **Digboi-** Digboi is located in the Dibrugarh District. Digboi oilfield was the only petroleum producing area of India till the 1950s. The oil from here is refined in the Digboi refinery. The important centers are Digboi, Bappapang, Panitola, Hassapang.
2. **Naharkatiya-** It is located in the South – West of Digboi. Naharkatiya oilfield is located on the left bank of the Burhi Dihang river. The oil from here is transported to Nunmati refinery in Assam and Barauni refinery in Bihar. For this purpose, the Naharkatia – Nunmati – Barauni pipeline was constructed and this was the first pipeline in India. This is now extended to Kanpur in Uttar Pradesh.
3. **Moran-Hugirijang-** The oilfield is located on the Brahmaputra river valley. This oil field was discovered in 1953. The oil from here is transported to Barauni refinery in Bihar.

Production volume of onshore crude oil across Assam in India from FY 2012 to FY 2018(in 1,000 metric tons)

YEAR	PRODUCTION(in 1000 MT)
FY2012	5025
FY2013	4863
FY2014	4709
FY2015	4473
FY2016	4185
FY2017	4203
FY2018	4345

SOURCE: Statista Research Department, 2019

Distribution in North-East other than Assam state

1. **Nigru region-** The oilfield is located in Tirap district in the state of Arunachal Pradesh.
2. **Borholla region-** The oilfield is located across the border of Assam-Nagaland.

INDIA: OIL REFINERIES IN INDIA



Distribution in the state of Gujarat

1. **Ankleshwar**- Ankaleshwar oilfield is the largest and the oldest (1960) oilfield in Gujarat. The oilfield is located 80km south of Vadodara and about 160km south of Khambhat. The oil is transported to Trombay and Koyali for refining.
2. **Khambhat and Lunej**- The oilfield is located in Borsad region, on the northern side of the Gulf of Khambhat.

Other important oilfields are:

Ahmadabad and Kalol oilfield, Mehsana oilfield, Sanand oilfield, Navagaon oilfield.

Distribution in the Western offshore region

1. **Bombay High**- The oilfield is located around 175 km south-west of Mumbai in the Arabian Sea. The production in the oilfield was started in 1976.
2. **Bassein**- The oilfield is located to the south of Bombay High.
3. **Aliabet**- The oilfield is located near Aliabet, an island 45km away from Bhavnagar in Gujarat, in the Gulf of Khambat.

Distribution in the Eastern coast region

1. **The Godavari-Krishna river basin oilfield**- The oil here is found in both the offshore and onshore regions. The first oil well in the region was dug in the year 1980 in south-east 75 km far from Kakinara.

Distribution in Kaveri Basin region

1. The oilfields in the Kaveri basin region are found in **Narimanam** and **Kovilappal**. The oil from here is transported to Kaveri refinery in Panaigudi near Chennai.

Distribution of crude oil reserves India state/region wise

The following table shows the estimated crude petroleum and in India by state/region as on 31 March 2017

Region	Crude oil reserves (in million metric tonnes)
Arunachal Pradesh	1.52
Andhra Pradesh	8.15
Assam	159.96
Coal Bed Methane	0
Eastern Offshore ^[a]	40.67
Gujarat	118.61
Nagaland	2.38
Rajasthan	24.55
Tamil Nadu	9.00
Tripura	0.07
Western Offshore ^[b]	239.20

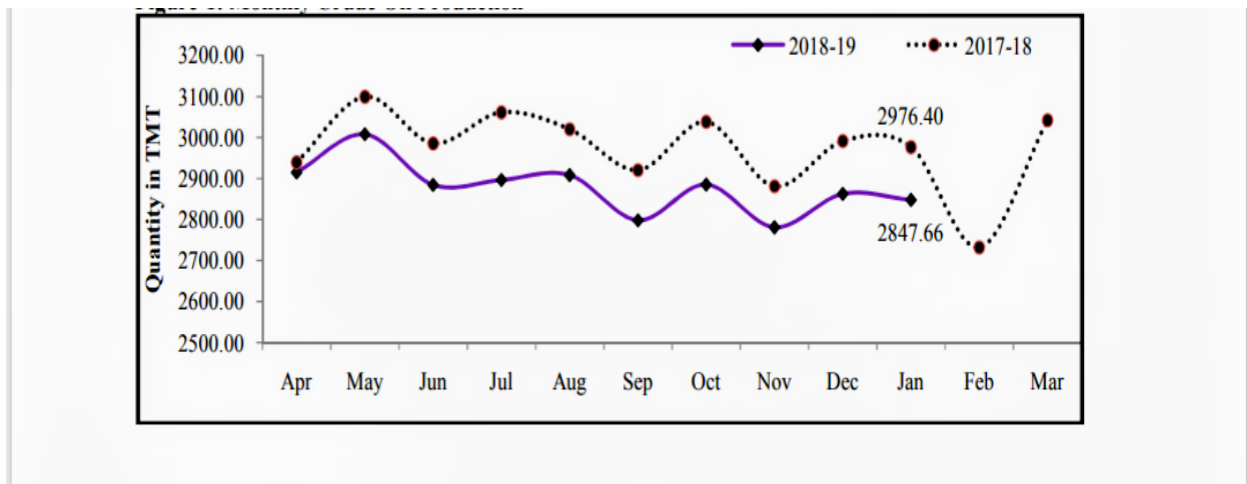
Production of crude oil in India:

Crude oil production during 2019 was 2847.66 TMT which is 11.85% lower than the target and 4.33% lower when compared with January, 2018. Cumulative crude oil production during the April – and production respectively during the corresponding period of last year.

INDIA: Crude Oil Production in TMT (Thousand Metric Tonnes)

Oil Company	Target	January (Month)				April-January (Cumulative)			
	2018-19 (Apr-Mar)	2018-19		2017-18	% over last year	2018-19		2017-18	% over last year
		Target	Prod.*	Prod.		Target	Prod.*	Prod.	
ONGC	23040.00	2018.62	1766.98	1836.79	96.20	19110.93	17675.14	18685.49	94.59
OIL	3738.00	332.47	254.79	285.40	89.27	3092.72	2771.38	2834.26	97.78
PSC Fields	10233.60	879.23	825.90	854.21	96.69	8568.64	8338.73	8391.46	99.37
Total	37011.60	3230.32	2847.66	2976.40	95.67	30772.30	28785.26	29911.21	96.24

INDIA: Monthly Crude Oil Production (for the year 2017-18 and 2018-19 in TMT)



(NOTE: Source for the production of crude oil in India has taken from the Ministry of Petroleum and Natural Gas, GOI)

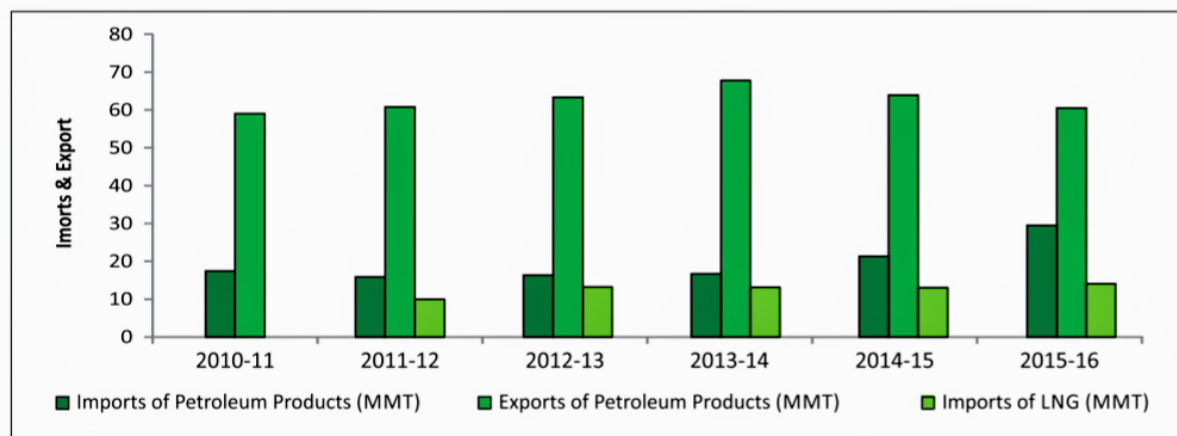
Imports & Exports of Petroleum Products in India

During 2016-17 imports of petroleum products were at 35.413 MMT which shows an increase of 20.22% in quantity terms. During the year 2016-17 exports of petroleum products were 65.513MMT which shows an increase in of 8.22% in quantity terms.

INDIA: Imports and Exports of Petroleum Products

Year	Imports of Petroleum Products (MMT)	% Growth in Imports of Petroleum Products	Exports of Petroleum Products (MMT)	% Growth in Export of Petroleum Products	Imports of LNG (MMT)	% Growth in Imports of LNG
2010-11	17.379	18.51	59.077	15.49	9.931	8.56
2011-12	15.849	-8.80	60.837	2.98	13.214	33.06
2012-13	16.354	3.18	63.408	4.23	13.136	-0.60
2013-14	16.697	2.10	67.864	7.03	12.995	-1.07
2014-15	21.301	27.57	63.932	-5.79	14.092	8.45
2015-16	29.456	38.28	60.539	-5.31	16.142	14.55
2016-17 (P)	35.413	20.22	65.513	8.22	18.631	15.42

INDIA: Trends in Imports and Exports of Petroleum Products (in MMT)



(NOTE: Source for the imports and exports of petroleum products in India has taken from the INDIAN PETROLEUM & NATURAL GAS STATISTICS 2016-17)