CHAPTER-1

INTRODUCTION

The oil sector is one of the important components of economic development. The majority of minerals, such as petroleum and coal, are employed as energy sources for rapid industrial development. According to the World Bank, the global oil rent[1] as a percentage of GDP in 2019 is 1.29 per cent. In some countries such as Libya, the Republic of Congo, Kuwait, Iraq, Angola, Oman, and Saudi Arabia, the contribution of oil (i.e., revenue minus production cost) to the GDP was estimated to be more than 24 per cent in the year 2019. (The World Bank, 2021)

Several studies at the global level identified numerous impacts of the oil industry on the domestic economy. New Zealand's Ministry of Business, Innovation and Employment (2012) underline the favourable economic impact of the oil and gas industry on the country's economy, which is the country's fourth-largest exporter. Direct royalty and taxes returns, higher-paid jobs, investment, regional development, and exports are the key economic benefits for the country in terms of GDP. According to a research by the Pennsylvania Economy League (2008), the oil and gas industry in Pennsylvania contributes significantly to direct employment and output, as well as several indirect job opportunities through its supply chain.

Many other studies, on the other hand, look at the impact of the oil industry from the perspective of regional sustainability, economic, and social justice. Even if the extractive industries have made a considerable contribution to the nation's development, previous studies have revealed that the local community must bear a cost in the form of adverse consequences on the sustainability of their livelihoods. Such a case is discussed by Mishra (2009) by addressing the impacts of coal mining in rural Orissa. In a similar vein, Panda et al. (2013) have also pointed out that the Orissa's mining sector increases the risk of food insecurity, high rates of malnutrition, water shortages, poor health, morbidity, unsustainable livelihoods, and distress migration for large segments of the population who are predominantly reliant on natural resources, such as tribals, farmers, forest dwellers, and wage labourers. Numerous studies carried out in various regions of the world also addressed the livelihood sustainability issues of the communities while

[1] *Oil rents* are the difference between the value of crude *oil* production at regional prices and the total costs of production.

participating in or living close to extractive industries. In this regard, the case of Ghana is worth noting, as its mining communities have been confronting the detrimental effects of mining operations on their sustainable livelihoods. Many studies conducted in Ghana have addressed the livelihood vulnerabilities by outlining various issues such as problems of recovering the productivity of the soil of the mining region after the end of the mining activity, along with the environmental and health risk due to exposure to numerous harmful contaminants (Yaaba Baah-Ennumh & Forson, 2017; and Shubita et al., 2023). Likewise, some other studies have found that extractive industries had a significant negative impact on traditional jobs, skills, knowledge, and cultural norms. Such an issue is observed in Niger Delta where a fishing community lost their traditional occupation due to river water contamination from oil exploration (Fentiman, 1996). At local level, extractive sectors have resulted in forced migration as a result of the loss of conventional livelihoods. In many places of the world, natural resource extraction has also resulted in gender disparities in workforce participation and various types of environmental damage (Fentiman, 1996; Stanely, 1996; Sosa & Keenam, 2001).

Although there is a paucity of prior study on the effects of oil extractive industries in the context of Assam, some studies have examined the impacts of extractive industries of a similar nature, such as coal mining, on the adjacent populations. The Tinsukia district has been the primary location for coal mining in Assam. The operations of North-Eastern Coalfield's coal extraction in Margherita have led to several health-related vulnerabilities of the local communities, according to Bhattacharjee & Sahoo's (2010) discussion. The health of the local population is negatively impacted by pollution from coal mine effluents. The impacts of coal mining on regional traditional livelihood systems were also discussed by Akram et al. (2021) in the Saleki area of the Dehing Patkai Elephant Reserve in Tinsukia, Assam. They noted that rural households in the mining area experience both positive and negative effects from the coal mining activities.

Thus, the previous studies give two opposite directional impacts of the extractive industries on the economy and the society. Though oil industry of Assam is one of the legacies of the British colonial rule, research on the impacts of this industry on the local livelihoods is very scanty. Therefore, it is very essential to conduct a study to understand the effects of the oil extractive industries on the local economy and livelihoods of the local communities including their sustainability issues. The present research tries to examine the impacts of oil extraction on the local rural livelihoods so that appropriate

policy may be developed to lessen any detrimental effects on the sustainability of livelihoods.

This introductory chapter is designed to give an overview of the oil and gas sector of India, as a whole, and Assam, in particular. The basic idea is to introduce the importance of the oil industry for national development. This is followed by a discussion on the motivation of the study where the primary driving factors behind taking up this research is presented.

1.1 Oil and gas sector of India

The oil industry is one of the six core industries of India. The importance of the oil sector in India's economy has been identified as critical to the country's economic growth. India, after China and the United States, is the world's third-largest energy consumer, accounting for 5.8 per cent of global primary energy consumption. Though coal, crude oil, natural gas, and renewable energy all contribute to India's total energy consumption, the oil and gas industry is the most important, accounting for one-third of the total. Because of its growing economy, and population and its compound annual growth rate (CAGR), India relies on domestic production as well as imports to meet its oil and gas needs. India produced 32.17 million metric tonnes (MMT) of crude oil and 31.18 billion cubic metres (BCM) of natural gas in the fiscal year 2019-20. For the years 2010-11 to 2019-20, the CAGR of crude oil and natural gas production in India was -1.8 per cent and -5.6 per cent, respectively. The trend of production of crude oil, natural gas, and petroleum products is presented in table-1.1.

Table 1.1
The trend of production in India's oil and natural gas sector

Year	Crude oil (in MMT)	Natural gas (in BMC)	Petroleum product (in MMT)
2013-14	37.79	35.41	220.76
2014-15	37.46	33.66	221.14
2015-16	36.94	32.25	231.92
2016-17	36.01	31.90	243.55
2017-18	35.68	32.65	254.40
2018-19	34.20	32.87	262.36
2019-20	32.17	31.17	262.94

Source: Ministry of Petroleum and Natural Gas (2021): IPNG Statistics, 2019-20

The oil industry contributes significantly to the government's revenue. Royalties, oil development cess, excise and customs taxes, sales tax, dividends, and goods and service tax are some of the ways it contributes to the government's revenue as shown in table 1.2. The total revenue generated from the oil sector in 2019-20 is found to be Rs. 4,92,110 crore, which is 2.42 per cent of the gross domestic product (at the current price) of the same year.

Table 1.2

Contribution of the oil sector to the Centre/State revenues

(Rs. in crore)

Year	Royalty from crude oil	Royalty from gas	Oil development cess	Excise and custom duties	Sales tax	Dividend	GST
2013-14	17212	2127	18901	73780	129045	14237	-
2014-15	16458	1942	14491	94239	137157	13912	-
2015-16	11432	2418	18112	173675	142807	14614	-
2016-17	12394	1876	15558	237675	166414	33487	-
2017-18	14821	1737	16775	222020	185850	29801	4974
2018-19	17200	2410	19402	163162	201265	30323	7961
2019-20	14726	2566	15150	226391	200247	25685	7345

Source: Ministry of Petroleum and Natural Gas (2021): IPNG Statistics, 2019-20

In addition, India's oil and gas sector generates jobs in a variety of fields, such as production and exploration, refining, marketing, pipelines, research and development, etc. Total employment created by oil and gas central public sector enterprises (CPSE) was 1,03,832 as of March 31, 2020. The largest percentage of employment was in production and exploration (28.9%), followed by the marketing sector (27.3%) and refining (24.4 %). IOCL and ONGC employed the highest manpower of all the oil and gas sector central public sector enterprises in the country. This is presented in table 1.3.

Table 1.3

Employment in different oil and gas central public sector enterprises (CPSE) as of March 31, 2020

Name of the CPSE	Employment generated (in persons)	Percentage
ONGC	30105	29.0
OIL	6680	6.4
GAIL	4582	4.5
IOCL	32998	31.8
BPCL	11249	10.8
HPCL	9696	9.3
CPCL	1684	1.6
MRPL	1942	1.9
NRL	914	0.9
Balmer Lawrie	1076	1.0
EIL	2806	2.7
Total	**103832**	**100.0**

Source: Ministry of Petroleum and Natural Gas (2021): IPNG Statistics, 2019-20

The oil and gas sector has a significant share in the total export trade of the country. This sector accounted for an 11.45 per cent share in the total export of the country in 2019-20. However, there is a deficit in India's oil and gas trade due to excess import over export. From the viewpoint of FDI inflow also, the oil and gas sector bears significance in the Indian economy. FDI inflow to this sector was 1.69 per cent of the total FDI inflow to the country. (Ministry of Petroleum and Natural Gas, 2021)

The journey of the oil industry in India started in 1889 in Assam. However, nowadays some other states viz.: Andhra Pradesh, Arunachal Pradesh, Gujarat, Rajasthan, Tamil Nadu, Tripura and West Bengal are also contributing significantly to the onshore production of crude oil and natural gas of the country. In addition to onshore production, India has been exploring petroleum (crude) and natural gas from offshore areas too.

1.2 Oil and gas sector in Assam

1.2.1 Historical background

Assam is a state located in the northeastern part of India, where oil exploration started under the colonial rule of the British in the 19th century. The discovery of crude oil in Assam was a big historical incident. For the first time, Lieutenant Wilcox discovered oil springs in Assam in the bed of the River Dihing near Supkong in 1825. Later, many others also witnessed oil seepages at different times at various places in Assam. The Assam Railways and Trading Company while constructing the Dibrugarh-Margherita railway route noticed oil seepages at present-day Digboi. In October of 1889, the Company discovered oil at a depth of 178 feet. A small refinery was built in Margherita, where crude oil from Digboi was carried by rail for six years. In 1899, the Assam Railways and Trading Company established the Assam Oil Company (AOC) and handed its rights and privileges over the Makum and Digboi oil fields to it. In 1901, the Assam Oil Company built a refinery in Digboi with a capacity of 500 barrels or 20,000 gallons per day. In 1921, the Assam Railways and Trading Company sold the Assam Oil Company to the Burmah Oil Company (BOC). To extend oil exploration, BOC extended its oil survey at Naharkatiya in 1951, where they discovered crude oil at a distance of 3570 meters only, under the ground. The discovery of oil at Rudrasagar and Gelakey in 1954, and Moran in 1956, ushered in a new era in the state's socio-economic transformation (Saikia, 2011; Mahanta, S. 2018). The timeline of the oil history of Assam has been summarized in table 1.4.

Table 1.4

Timeline of the oil history of Assam, 1825-1921

Year	Event
1825	• Lieutenant Wilcox discovered oil springs for the first time in Assam in the bed of the River Dihing near Supkong in 1825.
1828	• C. A. Bruce also reported about the existence of oil springs at Safrai and found oil seepages at Makum
1837	• Major White discovered multiple oil seeps at Nampong near the River Namrup.
1838	• Lieutenant Bigge and Captain Dr. Griffith discovered oil seeps while investigating the Namrup River for coal.
1838	• Jenkins also observed several oil springs near Borhat
1845	• Captain Hannay reported finding oil at Naharpung near the Namchik River.
1860s	• Medlicott saw some oil springs near Makum. • Mallet found traces of oil at Hukanjuri near Jaypur, Telpung near the Dikhow River, and Babu Barpung on the northern part of the Tipam Hills. • They were two officials from the Geological Survey of India.
1854	• In early 1854, Wagentriber, an Australian speculator got Makum oil fields on lease for three years. He tried to make an experiment to determine the quality and commercial value of the oil. • But, his experiment became unsuccessful.
1865	• After Wagentriber, Goodenough of Mckillop Stewart and Company of Calcutta (presently Kolkata) got a rent-free lease
1866	• Goodenough made his first systematic attempt at oil drilling at Naharpung which was unsuccessful. But in his second attempt, he found oil at a depth of 118 feet at Makum. This oil well became the

	first successfully mechanically drilled one in Asia. • For Goodenough transportation problem stood as a big issue.
1878	• Messrs Balmer Lawrie and Company secured a lease on rent of working in the Naharpung and Makum oil springs for fifty years. • This Company was also made with limited success.
1889	• Oil seepages were discovered at present-day Digboi by the Assam Railways and Trading Company while constructing the Dibrugarh-Margherita railway route. The company already had a twenty-five-year lease against royalties over the Makum oil fields, with the option to renew it for another twenty-five years. • In October of 1889, the Company discovered oil at a depth of 178 feet.
1892	• A small refinery was built in Margherita, where oil from Digboi was carried by rail for six years. • The Assam Oil Syndicate is another company that also took part in oil drilling.
1899	• In 1899, the Assam Railways and Trading Company established the Assam Oil Company and handed its rights and privileges over the Makum and Digboi oil fields to it. • Assam Oil Syndicate also transferred its rights to the Assam Oil Company.
1901	• The Assam Oil Company built a refinery in Digboi to replace the one at Margherita, with a capacity of 500 barrels or 20,000 gallons per day.
1921	• In 1921, the Assam Railways and Trading Company sold its shares to the Burmah Oil Company. • Thereafter, the Burmah Oil Company became the Assam Oil Company's commercial and technical managers.

1.2.2 Petroleum and gas production in Assam: A comparison

After the oil industry commenced in India in 1889, Assam remained the sole producer of oil until the 1960s. In terms of onshore crude oil and condensate production, Assam currently ranks third, after Rajasthan and Gujarat, with a 12.72 per cent contribution to the country's total production in 2019-20. Assam's crude oil production is dropping due to dwindling oil sources. However, a similar decline in oil production can be seen at the national level as well. Figures 1.1 and 1.2 illustrate this.

In the case of onshore natural gas production, Assam secured the top rank with a 10 per cent contribution to the total natural gas production of the country in 2019-20 (table 1.5). The trend of natural gas production in Assam and India as a whole is portrayed in figure 1.3 and 1.4

Table 1.5

State-wise production of crude oil and condensate in India, 2019-20

Source	**States**	**Production of crude oil and condensate**		**Production of natural gas**	
		Production (in TMT)	Percentage share	Production (in MMSCM)	Percentage share
Onshore	Andhra Pradesh	243	0.76	912	2.92
	Arunachal Pradesh	56	0.17	46	0.15
	Assam	**4093**	**12.72**	**3141**	**10.07**
	Gujarat	4707	14.63	1343	4.31
	Rajasthan	6653	20.68	1883	6.04
	Tamil Nadu	415	1.29	1097	3.52
	Jharkhand	-	-	5	0.02
	Madhya Pradesh	-	-	345	1.11
	Tripura	-	-	1473	4.72
	West Bengal	-	-	306	0.98
Offshore		16003	49.75	20635	66.17
Total production		**32169**	**100.00**	**31184**	**100.00**

Source: Ministry of Petroleum and Natural Gas (2021): IPNG Statistics, 2019-20

Note: total may not tally due to rounding off

Figure 1.1
Trend of crude oil and condensate production in Assam

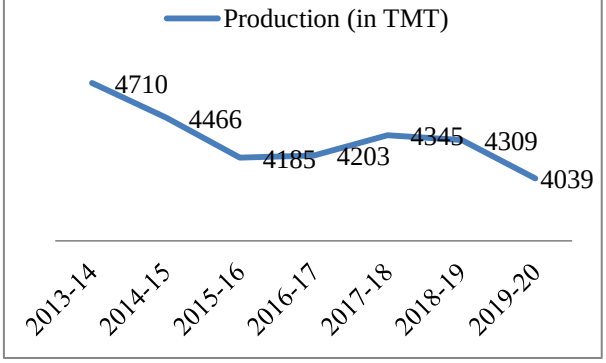


Figure 1.2
Trend of crude oil and condensate production in India

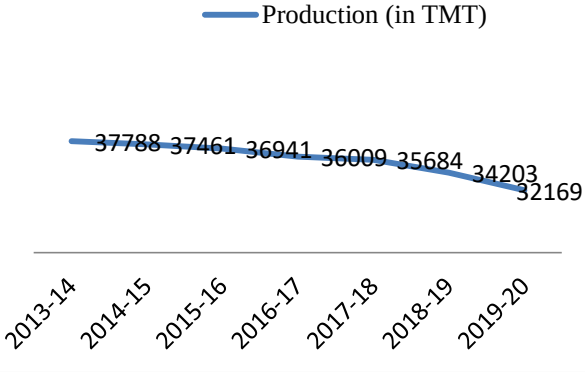


Figure 1.3
Trend of natural gas production in Assam

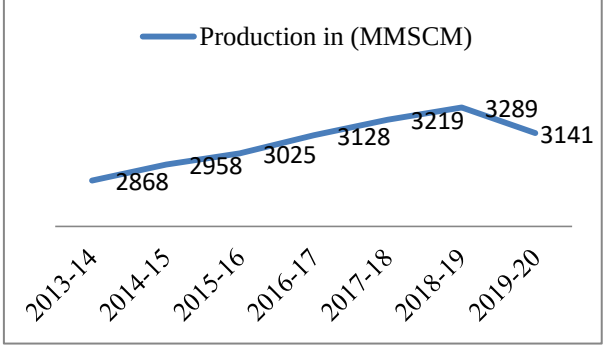
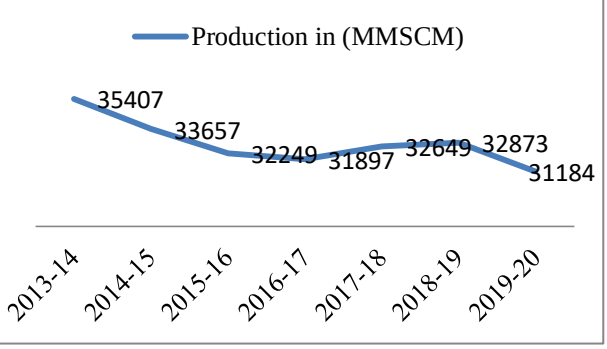


Figure 1.4
Trend of natural gas production in India



1.2.3 Royalty earned by the Government of Assam

As a state with rich petroleum (crude) and natural gas reserves, the oil sector plays a key role in Assam's economy in terms of revenue and job creation. Oil and Natural Gas Corporation Limited (ONGC) and Oil India Limited (OIL), both *Maharatna* and *Navratna* public sector companies of the Government of India, respectively, are the two largest oil companies in petroleum product exploration in the state (Department of Public Enterprises, 2022).

The government of Assam has been earning revenue from the oil and natural gas sector in the form of royalties, oil development cess, excise and customs taxes, sales tax, dividends, and goods and service tax. As per the statutory provisions of the Oilfields (Regulations and Development) Act 1948 and Petroleum and Natural Gas Rules 1959, the ONGC and OIL have been paying royalty to the Government of Assam, which is one of the state government's major sources of revenue. Oil royalty payments to the

Government of Assam amounted to Rs. 6320 crore (Rs. 1350 crores from ONGC and Rs. 4970 crores from OIL) across three financial years from 2008 to 2014 as shown in table 1.6.

Table 1.6

Royalty paid by ONGC and OIL to the Government of Assam

Period for which Royalty is paid	**Year of Receipt of Royalty**	**Amount of royalty (Rs. in crore)**
2008-2014	2016-17	948
	2017-18	2844
	2018-19	2528
	Total	**6320**

Source:

i) https://www.telegraphindia.com/states/north-east/oil-royalty-for-assam/cid/1427746

ii) https://economictimes.indiatimes.com/news/economy/policy/centre-agrees-to-pay-rs-6320-cr-as-oil-royalty-to-assam/articleshow/57272598.cms

iii) https://www.thehindubusinessline.com/news/national/centre-to-pay-6320-cr-as-oil-royalty-to-assam/article9553966.ece

(Accessed on May 15, 2020)

Thus, it is apparent that the oil and natural gas industries have played a significant part in the state's economic development. They not only contribute to the state's revenue, but also support the development of local areas through various infrastructure development initiatives, direct and indirect job creation, the creation of markets for local products, the provision of educational and health services, and the conservation of local biodiversity, among many other things.

1.3 Oil industry of Assam and Rural Livelihoods: Motivation of the study

Assam is a rural-based state having a total geographical area of 78,438 sq. km, with rural areas accounting for 98.4 percent of the total. It has a population of 3.12 crore, with 86 percent living in rural areas (Directorate of Economics and Statistics, 2020). The operational areas of the oil exploring industries are spread over mainly the

rural areas of the state. So, in addition to the state's economy at the macro level discussed above, it is expected to have a variety of impacts from the oil extracting industries on development of the surrounding rural areas.

There are numerous theoretical and empirical bases for the impact of an industry or a growth centre on the surrounding areas. Gunnar Myrdal, an economist, proposed in 1957 that industry generates two types of effects: spread effects (positive effects) and backwash effects (negative effects), both of which spill over into the surrounding areas; and that under normal conditions, the backwash effects outnumber the spread effects. With a few modifications, Hirschman opined in unbalanced growth theory 1958 that backwash effects are initially high as resources are drawn into the growth centre, but over time, backwash effects diminish and positive effects begin to spill over to the surrounding regions (Gana, 1978). So, considering such theoretical backgrounds, there is a scope of research to identify the impacts of extractive industries on the local rural livelihoods.

Many empirical studies also proved that the impacts of industries are linked to several components of rural livelihoods, such as livelihood assets, strategies, and outcomes of the neighbouring people. It is seen in many parts of the world that in addition to the direct contribution to the state's revenue, extractive industries generate numerous indirect impacts on the local livelihoods through spread and backwash effects. Most of the extractive industries such as coal mining, gold mining, and mineral exploration create several positive and negative impacts on local livelihoods (Fentiman, 1996; Burry, 2004; Schueler et al., 2011). India has also been experiencing different kinds of extractive industry-generated effects on local rural livelihoods, especially due to coal mining in different parts of the country such as Orissa, Jharkhand, West Bengal, Meghalaya, and Assam. Land acquisitions, transformations of livelihoods, environmental pollution, health risks, and social impacts are some of the major issues observed in the local economy as addressed by different researchers of the country (Mishra, 2009; Sen, 2014; Das, 2015; Behera, 2015; Hota & Behera, 2016).

Another motivation of taking up this research is that it will help to fill the study gap in this line. The previous studies regarding the extractive industry's impacts on the local community of Assam mostly cover the coal mining industries. Even though Assam's oil industry has been in operation since the late 19th century, primarily in rural

areas, few studies have been conducted on its impact on rural livelihoods. This study is expected to help fill a research gap, prescribe necessary policies for local rural livelihood development, and pave the way for future research.

1.4 Outline of the thesis

The present study has been organized into eight chapters.

Chapter 1 is introductory, which includes the history of the oil sector in India as a whole and Assam in particular, the present status of the oil sector, and the rationality of the present research.

Chapter 2 discusses the review of the literature and research gap.

Chapter 3 explains the objectives, methodology and analytical framework used in the study.

Chapter 4 describes the socio-economic profile of the study area.

Chapter 5 examines the impact of ONGC and OIL on the livelihood of rural people in the study area by adopting the sustainable livelihood framework of DFID (2001)

Chapter 6 examines the nature, extent and influencing factors of rural livelihood diversification in the study area.

Chapter 7 discusses the sustainability of livelihoods of rural people in the operational area of ONGC and OIL. In this chapter, a comparative analysis among the villages has been done in terms of sustainable livelihood by using the sustainable livelihood index.

Chapter 8 is the concluding chapter which presents the summary of findings, policy implications and scope for further research.