Lecture 9

Managing Resources (III): Extractive Industries



KEY QUESTION:

How do we manage the extraction of non-renewable resources by the extractive industries?

With the completion of this lecture, attached readings and tutorial, you should be able to discuss: - the characteristics of extractive industries

- variations in economic, environmental and social impacts of extractive industries between places

- varying success of strategies to manage impacts of extractive industries on places

Lecture Outline

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The well-known Deepwater Horizon oil spill happened in 2010. The rig explosion, which killed 11 workers and sent oil spewing into the Gulf of Mexico for 87 days, triggered one of the worst environmental disasters in US history. BP, one of the world's largest energy companies, is accountable for this event.

<u>Glossary of Terms</u> (These terms will be re-introduced to you in more detail in Topic 1.2 in subsequent lectures)

Production Circuit: An interconnected series of functions, operations and transactions through which a specific commodity, good or service is produced, distributed and consumed. Every economic activity can be thought of as a production circuit

Production Network: The full mesh of relationships (such as between the different suppliers, business owners, consumers, etc) that lies behind any economic activity.

Global Production Network (GPN): The production network very likely takes on a global characteristic, involving relationships among firms all over the world. A global production network (GPN) often results, leading to the eventual production of goods or services.

Transnational Corporation (TNC): A firm with the power to coordinate and control operations in more than one country, even if it does not own them.

State-owned Enterprise (SOE): A public enterprises that is directly owned and managed by the state.

9.1 Introduction: What are extractive industries?

Everything we use to communicate, move, stay warm, stay cool, sit, sleep, cook and refrigerate comes from the ... raw material that humans extract from the earth each year. (*Emel et al, 2002*)

Minerals ... [excluding oil] account for a small share of world production and trade. Nonetheless, their supply is essential for the sustainable development of a modern economy. They are basic, essential and strategic raw materials ... No modern economy can function without adequate, affordable and secure access to raw materials. (UNCTAD, 2007)

• The extractive industry consists of any operations that remove metals, mineral and aggregates

from the earth. In a very real sense, the extractive industries represent the 'beginning of the beginning': the initial stage in the basic **production circuit**¹ and in the web of **global production networks**² that make up the global economy.



Fig. 1 The basic production circuit

(More on this concept in Topic 1.2)

- The basis of the extractive industries is the notion of the **natural resource**: materials created and stored in nature through complex biophysical processes over vast periods of time.
- As **Fig. 2** shows, the extractive industries fall into three broad categories based upon the kind of minerals involved. For illustrative purposes in this lecture, we refer to (crude) oil and gas mostly.

¹ See glossary

² See glossary



• **Fig. 3** outlines the basic production circuit for extractive industries. At the most general level it is a relatively straightforward sequence of stages from exploration through to final consumption (although in fact it is a highly complex and contested process; see later sections).



Fig. 3 The basic extractive industry production circuit

9.2 Characteristics of extractive industries

9.2.1 Extraction of non-renewable and locationally specific resources

- The resources that form the basis of the extractive industries (energy materials like oil, as well as ferrous and non-ferrous minerals like iron ore and copper) are, effectively, **non-renewable**. They are fixed in overall quantity, at least under known technological conditions. The more we use today, the less will be available for tomorrow. (See again, **Lect 5**, for a review.)
- Quite apart from their finiteness, extractive resources are **locationally specific**. They are where they are. Their formation is to do with specific geologic (for example, near tectonic plate boundaries) and environmental conditions that are unique to certain places. For example, diamonds are found in only about 35 countries within Kimberlite rocks formed under very high heat and pressure, and (crude) oil more often found in deserts and arctic areas.
- They have to be exploited, at least initially, where they occur, although later stages of refining might well be located elsewhere.

9.2.2 Capital and technology intensive

- The core of the extractive industries, as Fig. 3 earlier shows, is the sequence of stages from exploration through development, extraction, processing and distribution to consumption. Each of these poses immense technological challenges.
- In general, **highly expensive**, **sophisticated technologies** have to be employed at **all** stages of the production circuit. For example:
 - Building a large base-metals mine can cost over a billion dollars;
 - The magnitude of investments in the oil and gas industry is even greater;
 - Constructing a pipeline, developing an oil deposit or revitalising an ailing, underinvested mineral industry can run into many billions of dollars.
- Capital intensity is extremely high while labour intensity is low. These industries employ few workers relative to their size.
 - For example, the biggest non-state oil company in the world, ExxonMobil, employs around 80,000 workers. The biggest metal mining company, BHP Billiton, employs 42,000.
 - In comparison, the retailer Wal-Mart employs 2,100,000 workers while the automobile company Toyota employs more than 300,000.
 - The difference is especially dramatic if we compare sales per worker: ExxonMobil \$4.83 million; BHP Billiton \$1.43 million; Wal-Mart \$180,000; Toyota \$730,000.
- Firms in the extractive industries face **three** closely related technological challenge, largely because they are dealing with 'depleting assets':

(1) Finding new sources of supply

- Once an oil well dries up or a copper mine becomes exhausted, it cannot be regenerated.
 New sources of supply must continuously be sought as existing sources become exhausted and/or too expensive to exploit at prevailing market prices.
- This is not unlike searching for needles in haystacks. Immensely sophisticated techniques of geochemical, geophysical and satellite remote sensing techniques are involved.
- In addition, the time (and investment) needed to locate and develop a supply source can be very long indeed. Vast investments are made over many years in the hope that a breakthrough will occur. In fact, of course, the majority would fail.
- A major problem, therefore, is that most of the easily accessible sources have already been exploited. New resources almost invariably tend to be found in less accessible locations and also often in circumstances making their extraction extremely difficult and, therefore, costly. The deeper the resource below the surface, the greater the problems involved.
- (2) Extracting the highest yield from these sources
- The **purity of a resource** is an especially important factor. The **lower the degree of purity, the greater the cost** involved in extraction and processing, to the point where they become uneconomic.
- Both <u>exploration</u> and <u>extraction/processing</u>, therefore, involve very high sunk costs.

- (3) Getting them to the market
- High sunk costs is also true of the <u>distribution</u> stage. Again, all industries face problems in getting their products to market. But the particular characteristics of the extractive industries

 especially their bulk and remoteness from markets generate the need for a massive scale of transportation infrastructure that is virtually unique. The trade-off between increasing the scale of production and being able to transport the outputs is a central problem in these industries.
- Massive investments in pipelines, supertankers, port facilities and the like are a prerequisite.
 They represent a very high sunk cost, because many of these facilities are highly specialised and not easily transferred to alternative uses.
- **Fig. 4** below shows the global production network (GPN) of oil. (We shall learn more about GPN in **Topic 1.2**). It shows that in the process of commodifying oil, much technological and capital investment is involved.



Fig. 4 A GPN for oil

9.2.3 Dominated by large private and state-owned firms

- To a greater extent than most other industries, the extractive industries are made up of a strong mix of private firms (TNCs³) and state-owned enterprises (SOEs⁴), although the dominance of each may differ between sectors. They are also dominated by giant firms (see Tables 1 and 2).
- The top 10 companies shown in **Table 1** account for around 60% of world **oil** production. No fewer than 3 of the top 5, and 15 of the world's 25 largest oil producers are fully or majority state owned, the result of the widespread nationalisations (see **section (a)** later). On the other hand the top 10 mining companies shown in **Table 2** produced around one-third of total world output in 2007 but the degree of state ownership in metal mining is significantly lower (see **section (b)**).
- For our purpose, we consider two models of ownership of resources seen in extractive industries:
 - State ownership and state exploitation: In this model, the benefits of extraction are shared by all citizens as government revenue. This is possible with state-owned firms.
 - State ownership and private exploitation: Here, private firms pay some kind of licensing fee to extract a publicly owned natural asset – for example, when oil or mining companies purchase exploration rights. In such cases, royalties are then usually paid to governments based on the amount of the resource that is extracted.

Rank 2012	Rank 1995	Company	Home country	State ownership (%)	Total production (million barrels/day)
1	1	Saudi Aramco	Saudi Arabia	100	12.5
2	3	Gazprom	Russia		9.7
3	3	NIOC	Iran	100	6.4
4	5	ExxonMobil	USA		5.3
5	7	PetroChina	China	100	4.4
6	13	BP	UK		4.1
7	6	Royal Dutch/Shell	UK/Netherlands		3.9
8	4	Pemex	Mexico	100	3.6
9	16	Chevron	USA		3.5
10	9	KPC	Kuwait	100	3.2
11	23	ADNOC	UAE	100	2.9
12		Sonatrach	Algeria	100	2.7
13	33	Total	France		2.7
14	20	Petrobras	Brazil	100	2.6
15		Rosneft	Russia		2.6
16		MoO	Iraq	100	2.3
17		QP	Qatar	100	2.3
18	11	Lukoil	UAE		2.2
19		ENI	Italy		2.2
20		Statoil	Norway	100	2.1

Table 1	The world's largest oil and gas companies, 2012

Table 2	ine world's largest metal mining companies					
Rank 2007	Rank 1995	Company	Home country	State ownership (%)	Percentage share of world production	
1	6	Vale	Brazil	12	5.2	
2	4	BHP Billiton Group	Australia		4.6	
3	1	Anglo American plc	UK	ne piie ki	4.3	
4	2	Rio Tinto plc	UK		4.0	
5	5	Codelco	Chile	100	3.4	
6 borg	11	Freeport McMoran	USA		3.3	
7	7	Norislk Nickel	Russian Federation	-	2.7	
8	8	Xstrata plc	Switzerland		2.4	
9	14	Barrick Gold Corp.	Canada		2.3	
10	22	Grupo Mexico	Mexico	-	1.6	

Table 2 - un r

⁴ See glossary

³ See glossary

- (a) State-owned Firms
- In Topic 1.2, we will be learning how important the role of the state is in the global economy. Nowhere is the degree of state involvement as deep or as pervasive as in the extractive industries, especially in oil. In these industries, the state is absolutely central. The reason, of course, lies in the unique territorial embeddedness of resources. Access to such resources is controlled, ultimately, by the national state in which they are located.
- As Fig. 4 shows, the state operates within an extractive GPN as both a regulator (of access, taxation, and health, safety and environmental issues) and a business owner (an actual producer). This situation gives states potentially enormous power over how such resources are exploited. How effective that power is and how it is exercised, of course, depend very much on the nature of the state in question, notably its strength (both domestically and internationally) and its political orientation.
- The trend in recent years in the energy sector has been the expanding role of large SOEs in seeking control of natural assets. In several emerging economies around the world, such enterprises dominate natural resource sectors. In Russia, Gazprom, for example, is the world's largest natural gas producer and is linked to Russia's leadership in complex ways. Oil extraction in the Middle East is also carried out almost exclusively under the auspices of state-owned companies (see again, Table 1).

(b) Private firms

- The central problem facing all resource-rich states is how to exploit their resources to achieve the maximum gain when, as we have seen, the costs of finding, developing, extracting, processing and distributing the product can be astronomically high.
- In most cases, **the initial development of a country's <u>resource industry</u> (both oil and mining) has depended on outside investment (that is, private firms). Indeed, in the early 20th century, Foreign Direct Investments (FDIs) went mostly into these industries, reflecting the international expansion of firms that originated from the colonial powers. The objective of TNCs in the extractive industries was to gain direct control over the mineral resources required as inputs for their growing manufacturing and infrastructure-related industries.**
- However, for the <u>oil sector</u>, the growth rate of private firms has slowed considerably since the 1960s, with more nationalisation of extractive industries (see section (a) earlier). As mentioned, a clear indication of such a change in the global landscape is provided by the prominent position of state-owned firms among the world's largest oil companies (see Table 1).
- Hence, whereas the oil industry now is dominated by national companies, the degree of state
 ownership in metal <u>mining</u> is significantly lower. This is a consequence of more widespread
 adoption of privatisation policies by the state in these countries, reasons for which may include
 failure cases of nationalisation, or to relax policies to attract foreign investment (see Table 2).
- It is therefore not wise to make a general claim on whether state-owned or private-owned firms are more dominant in the extractive industries as situations would differ.

9.3 Variations in impacts of extractive industries between places

- As a key global economic activity, extractive industries have played a significant role in generating wealth for many countries, but they are also known to have caused many resource-rich countries to remain poor (see **Section 9.3.1**).
- In addition, extractive industries are generally associated with negative environmental (see Section 9.3.2) and social (see Section 9.3.3) impacts, although the extent of their severity can indeed vary between places.
- Often, whether a country hosting extractive industries obtain benefits from them, or limit their severity, depends very much on whether the strategies (see **Section 9.4**) used to manage these impacts are successful.

9.3.1 Economic impacts

- While some countries such as Norway and Australia benefitted economically from hosting extractive industries, many others such as Nigeria and Angola do not.
- As we have learnt in **Section 9.2.2**, extractive industries are capital and technology intensive at all stages of the production circuit. Also in **Section 9.2.3(b)**, resource-rich countries may therefore choose to allow private firms to help them extract their natural resources, especially if they are low-income countries with limited financial ability to support a capital and technological intensive industry.

(a) Extractive industries contribute to the economy

(+ve impact)

- Extractive industries are known to generate economic growth, job creation, government revenue, and stimulate infrastructure development.
- Example 1: Botswana and diamonds
 - Botswana, a developing country in Africa, stands out among its neighbours that have grown economically because of its diamond production. In fact, it was one of the world's 25 poorest countries before diamond production took place. Today, Botswana is be considered a middle-income country.
 - The mining sector reached its peak in 1989, accounting for more than 50% of GDP. It was also a major generator of revenue for the government. The mineral share of government revenue grew from almost nothing at independence (1966) to about 60% in 1989. Currently it is around 50% of total revenue.

(b) Limited local job creation <u>and</u> economic leakages

(-ve impact)

- Given the high capital and low labour intensity of the extractive industries, the creation of local employment may be limited. Moreover, it is likely that a country requiring assistance from TNCs would not have the required labour force in terms of skills training to operate the imported, highly mechanised and sophisticated technologies for the purpose of resource extraction.
- Bearing in mind that the objective of TNCs in the extractive industries was to gain direct control over the mineral resources required, there is **little incentive for them to train local population in**

the skills demanded. Such a transfer of skills and technological know-how should not be taken as a given, and would have to be negotiated for by the state. Without such a condition, over time, the local population would not acquire specialised skills that may help the country groom its own core group of labour that would allow it to gain back control over the resources.

- There is also a tendency for TNCs to repatriate profits, rather than reinvesting in the local economy. Also, when considered together with the local laws of some countries allowing tax breaks (to entice TNCs to remain), the overall amount of economic leakages can be phenomenal.
- <u>Example 2:</u> Nigeria and oil
 - The oil and gas sector (dominated by Shell) in Nigeria is highly capital-intensive and employs only a handful of highly-skilled and well-paid workers. Because of their lower level of skills and education, very few Nigerians are employed in Nigeria's biggest sector. This would mean that Nigerians have very limited access to the benefits of the oil industry which results in most of the profits being concentrated within the government and foreign companies.
 - In a report by the civil society organisation ActionAid in 2016, it was revealed that Nigeria lost out on US\$3.3 billion as a result of an extraordinary ten-year tax break granted by the Nigerian governments to some of the world's biggest energy companies, such as Shell and Total.

9.3.2 Environmental impacts

- There can be no doubting that extractive industries involves a range of environmental impacts.
- Many examples suggest that the impact may be so severe that the regenerative capacity of nature is compromised, especially in environmentally sensitive areas.

(a) Habitat destruction and deforestation

- Vegetation is stripped and soil and rock moved, both for the extraction process itself and the concomitant building of plant, administration and housing facilities, and the history of mining and various extractive activities has left considerable areas of disrupted and degraded habitat.
- Example 3: Habitat destruction Phosphate mining in Nauru
 - Several small coral islands in the Pacific Ocean exploited for their **phosphate**, the fossilised remains of centuries of birds' dropping, are among the worst affected.
 - Open cast phosphate mining on the Pacific island state of Nauru involved scraping off the surface soil to enable removal of the phosphate from between the walls and columns of ancient coral.
 - A severely degraded landscape of highly irregular solution-pitted limestone remains over about 80% of the island's 2100 ha area. Many of the indigenous plants and animals that previously inhabited the mined-out areas have either disappeared or are endangered.

 Indeed, virtually all of these mined areas, except for narrow corridors either side of gravel roads, are now totally unusable for habitation, crops, or anything else that might benefit the people of Nauru.





Fig. 5 Phosphate mining has gutted Nauru's elevated interior, known to locals as Topside

• Example 4: Deforestation – Coal mining in Kalimantan, Indonesia

- More than half of all tropical deforestation directly attributable to industrial mining takes place in Indonesia. Indonesia accounted for 58.2% of the deforestation caused by mineral extraction operations.
- Coal extraction in the Indonesian province of East Kalimantan drove the mining-related deforestation in the country. Coal mining in Indonesia in particular doubled between 2010 and 2014 as output grew to match increased demand from China and India. Specifically, in East Kalimantan, 19% of the tree cover was lost over the past two decades.

(b) Soil, Air and Water Pollution

- Pollution from mineral extraction, transportation and processing can also present serious environmental problems, affecting soil, water and air quality. (We have already learnt about this in Lecture 4 Section 4.4.2(b) in the example of the collapse of the Fundão dam, Brazil.)
- Example 5: Bauxite mining in Pahang, Malaysia
 - Bauxite is refined to produce alumina, which is used to produce aluminium a component in the manufacture of cans, household appliances and aircraft.
 - The indiscriminate and largely unregulated bauxite mining activities have stained the state crimson. During periods of heavy rains, it can colour the rivers and sea water near red.
 - Water and soil samples collected from affected areas found that the presence of suspended solids such as aluminium, iron, manganese and chromium was much higher than in unaffected rivers and soils.
 - Researchers are concerned that bauxite mining had released a high concentration of naturally occurring metal ions in the soil, such as mercury, cadmium, arsenic and chromium. These may have flowed into the rivers and ended up in the drinking water of Pahang's residents.
 - The lightness of bauxite minerals has also polluted air quality severely. Residents living along truck routes transporting bauxite to the port suffer from frequent coughs and headaches.

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Fig. 6 Bauxite mining in Pahang, Malaysia

Example 6: Oil extraction in Bayelsa state, Niger Delta, Nigeria

- Oil was first pumped in Bayelsa in 1956 by Shell. Since then, several international oil companies have extracted oil from across the Niger Delta.
- In Bayelsa and elsewhere, communities have faced an environmental catastrophe. About
 40 million litres of oil are spilled every year across the Niger Delta, according to an estimate.
- Air, land and water have all been contaminated, with studies reporting devastating effects on residents' health and livelihoods. Vast areas of the state's waterways and mangrove swamps – one of the most diverse ecosystems in Africa – have been destroyed or put at risk. Farmland has been cloaked in oil, contaminating crops and exposing people to high levels of heavy metals such as chromium, lead and mercury.
- Meanwhile, gas flares where natural gas associated with petroleum extraction is burned off in the atmosphere – have filled the air with pollutants, and created acid rain. (See Fig. 7)
- Communities here suffered life-changing health consequences as a result of oil pollution.
 Life expectancy has been cut short to as low as 45 years old. Infant mortality is high, as well as increased cases of kidney damage, and cancer reported.



Fig. 7 Gas flaring in Nigerian oil fields

9.3.3 Social impacts

• Extractive industries can have significant social impacts on communities and societies where they operate. These impacts can vary depending on factors such as the nature of the industry, the region, and the level of community engagement.

(a) Health and Safety Risks

- Extractive industries expose workers and nearby communities to health and safety risks due to the handling of hazardous substances, accidents, and inadequate working conditions. These risks can result in injuries, long-term health problems, and fatalities.
- In Examples 5 and 6 above, the health risks faced by locals are already documented. Example
 7 below provides information about risks faced by workers.
- Example 7: Coal mining in Jharia, India
 - Jharia coalfields are known to produce the finest quality coal in India. In 2020 accounted for 44 percent of India's primary energy demand.
 - Due to poor ventilation, unstable mine structures, and inadequate safety measures, accidents and fatalities are not uncommon across the 110 sq miles of land that make up the Jharia coalfields. According to official records, there have been 27 serious incidents and 15 fatalities between 2015 and 2017. Local activists believe the numbers could be much higher; the data didn't include accidents that took place outside the mines, or the deaths of those who weren't employed formally.
 - Workers complain of persistent coughs, headaches and "pain on the lungs". Respiratory diseases like tuberculosis, bronchitis and asthma are all common.

(b) Conflicts within the Community

- Extractive industries can exacerbate social tensions and inequalities within communities due to competition for resources, unequal distribution of benefits, and disputes over compensation.
 This can lead to conflicts, violence, and an overall strain on community well-being.
- <u>Example 8</u>: Oil extraction in Niger Delta, Nigeria
 - The competition for oil between insurgent groups (e.g. *Ultimate Warriors of Niger Delta*) and officials has promoted violence in Nigeria, exacerbating ethnic tensions in this diverse nation. There are frequent attacks on pipelines and oil fields, especially smaller ones.
 - Additionally, many of these youths have resorted to acts of abduction, hostage-taking, kidnapping and extra-judicial killings. The youths involved in these attacks are usually unemployed or underemployed.
 - Their motivations for starting these attacks are in part due to the resentment these marginalised youths feel towards the corrupt government. Additionally, they seek to seize some of the oil fields for their own usage, perceiving them as compensation for the land appropriation and environmental damages.

9.4 Strategies to manage impacts of extractive industries on places

9.4.1 Economic diversification and prudent investment

Many scholars have focused on the economic policy changes required to enable resource-rich countries to overcome the resource curse. Several economists, for instance, have emphasised the need for resource-rich countries to adopt sensible macroeconomic policies and, in particular, control inflation, pursue competitive exchange rates and **diversify their economies** so as to reduce their dependence on natural resources.

• Refer to Lect 2 Section 2.2.2 for a recap of the steps a government can take

• Example 9: Bostwana's Economic Diversification

- The Business and Economic Advisory Council (BEAC) was set up in 2005. This council was tasked to identify constraints that could restrict economic diversification and to formulate a key strategy and action plan to overcome them.
- Under the plan, financial resources were allocated to develop the manufacturing industry. This was done through providing the requisite infrastructure and institutions for private sector development. The type of goods that were manufactured increased as well, from being mainly meat and meat products to including other consumer goods and intermediate goods. Other sectors supported include agriculture and tourism.
- Economic diversification ensures that Botswana would have continual revenue earnings in the case that the diamond market contracts.
- Yet others again have argued that resource-rich countries need to pursue an investment strategy whereby investments are made prudently. This can be seen in examples of Sovereign Wealth Funds (SWFs), such as in Norway (see Example 10). The establishment of sovereign wealth funds entails saving resource earnings for the future, insuring against the long-term decline of revenues due to the likely depletion of non-renewable resources and ensuring intergenerational equity.

• <u>Example 10</u>: Norway's Government Pension Fund

- The Government Pension Fund Global, also known as the Oil Fund, was established in 1990 to invest the surplus revenues of the Norwegian oil sector. In 2023, it has over US\$1,370 billion in assets and held 1.4% of all of the world's listed companies in 2019, making it among the world's largest sovereign wealth funds.
- The Government Pension Fund Global collects the net cash flow from oil activities and the return on its investments which is then used to finance the government's debts. It also invests exclusively abroad, in terms of foreign currencies, to prevent unnecessary valuation to the Kroner (currency used in Norway). By ensuring the Kroner's stability in the foreign exchange market, it prevents other exporting industries from being compromised.
- The creation of such funds ensures the financial sustainability of Norway. With a pool of money always at the disposal of the parliament, they are able to finance responses to shortterm and long-term challenges. Such sustainable management of its oil profits has ensured the viability of its economy amidst the volatile global economy.

[Economic]

9.4.2 Transparency and accountability

[Social and Economic]

 Transparency initiatives can foster trust and accountability between the government and citizens, but their success depends on the willingness of companies and governments to share information. The effectiveness of transparency efforts can also be limited by inadequate access to information and limited public awareness.

• <u>Example 11</u>: Corruption in Norway vs Nigeria

- Corruption significantly reduces the accountability of the government. This would make quelling dissent difficult thereby promoting civil conflict.
- Norway is rated an A on the Corruption Perceptions Index in 2022. Here, corrupted practices pertaining to the petroleum industry are minimised by distancing politicians from the finances of the industry. This was carried out through the establishment of the Bank of Norway which manages Norway's oil revenue.
- Additionally, there are frequent internal audits within the Bank to ensure their accountability.
 Although this measure does not cultivate honesty per se, it does ensure honest and ethical practices are carried out.
- Nigeria, on the other hand, is rated D on the Corruption Perceptions Index in 2022. The government's corrupted practices can be seen through its management of Nigeria's national oil company – the Nigerian National Petroleum Corporation (NNPC).
- The NNPC carries out joint ventures with oil TNCs and is guided by a 60-40 percent sharing formula for the federal government and TNCs respectively. However, most of the revenue earned are siphoned away by corrupted officials, excluding the oil producing communities and the Niger Delta region.

9.4.3 Regulation and enforcement

[Environmental]

- Stringent environmental regulations and effective enforcement mechanisms are crucial to
 ensuring that extractive companies comply with environmental standards and minimise their
 negative impacts.
- <u>Example 12</u>: Enforcing TNCs to bear responsibility for their processes BP's Deep Water Horizon, USA
 - On 20 April 2010, BP's Deepwater Horizon platform suffered an explosion which killed 11 people and discharged 4.9 million barrels of oil into the Gulf of Mexico, USA. This spill devastated hundreds of miles of coastline and threatened people's livelihoods as well as damaging the marine and coastal ecosystems, especially in the estuaries and wetlands which border the coast.
 - In November 2012, BP accepted responsibility for the accident and pleaded guilty to manslaughter in relation to the 11 deaths. The company also funded a \$20 bn trust for claims against the company and to rectify the ecological damage caused by the oil spill, which was the largest-ever accidental spill in the history of oil exploration, extraction or transportation.

• <u>Example 13</u>: Enforcing environmental protection in oil extraction activities in Norway

- Norway has established stringent regulations and safety standards for its offshore oil operations. As a result, incidents of oil spills in Norwegian waters have been comparatively rare, minimizing environmental harm and ensuring the protection of marine ecosystems.
- TNCs are also regulated through Norway's Pollution Control Act and the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention).
 Companies operating in Norway must apply for a discharge permit in order to discharge chemicals and oil. This resulted in Norway being responsible for only 5% of total oil discharges in the North Sea.
- The petroleum activities have not caused major acute discharges of oil that have led to environmental damage. Additionally, all acute discharges from facilities are reported to the Norwegian Coastal Administration where immediate action will be provided so as to limit the effects of the discharge.

9.4.4 Rehabilitation and restoration

[Environmental]

- Efforts in rehabilitation and restoration within extractive industries are crucial for mitigating the environmental impacts of resource extraction. These initiatives aim to restore ecosystems and landscapes that have been affected by extractive operations.
- Example 14: Rehabilitation of the lignite mines in Lusatia, Germany
 - Lignite (a form of coal) mining has a long history in the region, Lusatia in Germany. By 1975, the mines had created environmental destruction and pollution of the air, ground, and water on a massive scale.
 - After the German reunification, almost all the mines in southern Lusatia were closed. A
 pressing question arose: what to do with the deep, expansive open pits that scar the area
 from decades of rampant lignite mining? And how to repair the environment? It was a
 puzzle, but also an opportunity.
 - To solve it, the government set up the Lausitz and Middle Germany Mining Administrative Company, or LMBV, in 1994. LMBV flooded the old mines, and turned them into lakes (24 of them and 140 km² of water surface is newly available for swimming and boating) (see Fig. 8). It treated and cleaned the water polluted by mining. It replanted forests, sold land to be used for fields of solar panels and wind turbines, and encouraged agriculture.
 - Observers reported that the ecology is recovering, with the return of fishes which have colonised the artificial lakes by way of new canals that did not previously exist or were too acidic to support life.

Fig. 8 A flooded Lake Zwenkau in Zwenkau, Germany



9.5 Concluding remarks: Why do strategies work better in some places than in others?

• The success of strategies to manage impacts of extractive industries varies due to a combination of factors that influence the implementation, effectiveness, and outcomes of these strategies. As such, the success of strategies to manage impacts of extractive industries can vary widely, even within different regions or projects within the same country.

Political will

The political will of governments and leadership plays a crucial role in the success of impact management strategies. From the **earlier examples**, we can identify **Norway** and **Botswana**. Commitment to environmental sustainability and responsible resource extraction is essential for enforcing regulations, promoting transparency, and holding industries accountable for their actions. Changes in political leadership or priorities can impact the continuity and effectiveness of strategies. Strong political will is required to resist pressure from industry interests that may prioritize short-term profits over environmental and social concerns.

Economic context

- The economic conditions and pressures in a country or region can significantly impact the implementation and success of impact management strategies. Countries heavily reliant on extractive industries for revenue (such as **Nigeria**) may face challenges in balancing short-term economic gains with long-term environmental and social sustainability. Economic pressures can lead to trade-offs between immediate financial benefits and investments in responsible practices. The urgency to generate revenue can sometimes overshadow the consideration of environmental and social impacts.
- Cultural and social factors
 - Cultural values, social dynamics, and historical context shape the success of impact management strategies. In **Botswana**, the relatively homogeneous population (80% Tswana) contrast against the more diverse (and less trusting) population in Nigeria. In **Norway**, a highly educated population and workforce help them to be tapped on for employment in the oil sector. Also, the Norwegian society has a culture, and the means, of holding the government responsible to carry out fair and effective policies justly. In Nigeria, this is absent.

List of examples cited in this Lecture					
• Example 1: Botswana and diamonds (+ve econ)	• Example 8: Oil extraction in Niger Delta, Nigeria				
 Example 2: Nigeria and oil (-ve econ) 	• Example 9: Bostwana's Economic Diversification				
 Example 3: Habitat destruction – Phosphate 	• Example 10: Norway's Government Pension Fund				
mining in Nauru	Example 11: Corruption in Norway vs Nigeria				
 Example 4: Deforestation – Coal mining in 	Example 12: Enforcing TNCs to bear responsibility				
Kalimantan, Indonesia	for their processes – BP's Deep Water Horizon, USA				
• Example 5: Bauxite mining in Pahang, Malaysia	• Example 13: Enforcing environmental protection in				
• Example 6: Oil extraction in Bayelsa state, Niger	oil extraction activities in Norway				
Delta, Nigeria	• Example 14: Rehabilitation of the lignite mines in				
 Example 7: Coal mining in Jharia, India 	Lusatia, Germany				