

6

TWO BLACK GOLDS: PETROLEUM EXTRACTION AND ENVIRONMENTAL PROTECTION IN THE CASPIAN SEA

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The Caspian is an inland sea bordered by Azerbaijan, Kazakhstan, Turkmenistan, the Russian Federation and the Islamic Republic of Iran. After the fall of the Soviet Union, the Caspian's potential oil reserves caught international attention, and the new states surrounding the sea found themselves courted by multi-national oil companies and western diplomats. Estimates of the Caspian's oil wealth have varied, but the highest speculate that the region holds reserves close to that of the Persian Gulf, almost all of it located offshore.

Environmentalists fear the Caspian's ecosystem will be sacrificed in favor of politics and energy wealth. This paper will explore the constraints of environmental protection in the Caspian and suggest possible methods to achieve some measure of balance between oil production and the environment. Command-and-control techniques, in the guise of technology specifications, are a valid tool in setting environmental policy. An important aspect of these specifications however, is to provide incentives for firms to develop better technologies. This can be done by setting pollution thresholds and allowing firms to devise their own methods for controlling pollution. Market-based incentives could also work in the Caspian, however the forces driving policy in the region today make agreement among the Caspian states difficult. Pollution taxes

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are also complicated due to the complicated nature of finding an appropriate tax that provides incentives for companies not to pollute. A permit trading system, whereby companies traded permits instead of the Caspian states, would be more feasible. To ensure success, local environmental groups must be a part of the process.

INTRODUCTION

The Caspian is an inland sea bordered by Azerbaijan, Kazakhstan, Turkmenistan, the Russian Federation, and the Islamic Republic of Iran. The Caspian's oil wealth has left lasting impressions on visitors and inhabitants since ancient times. Zoroastrians worshipped eternal flames fueled by natural gas that spouted from fissures in the earth. In his description of the area, Marco Polo wrote of oil seepages that local residents used for medicinal purposes. In the late 1800s, first the Russian Tsar and then private entrepreneurs exploited the oil of Azerbaijan (Yergin 1992). The sea itself was not a large part of the picture at this time. Offshore drilling technology was a long way off and there was still much oil to be exploited under the earth. The Soviets nationalized the oil industry after the 1917 revolution and during the next seventy years oil continued to flow, both onshore and off (Yergin 1992). The Soviets in their industrialization campaign developed a natural gas industry in Turkmenistan and a few oilfields inland in the republic of Kazakhstan (Yergin 1992).

After the fall of the Soviet Union, the Caspian's potential oil reserves caught international attention, and the new states surrounding the sea found themselves courted by multi-national oil companies and western diplomats. Estimates of the Caspian's oil wealth have varied, but the highest speculate that the region holds reserves nearly as large as that of the Persian Gulf. Almost all of it is located offshore ("Details" 1998).

Environmental groups, both local and international, fear the Caspian's ecosystem will be sacrificed in favor of energy wealth. This paper will explore the constraints of environmental protection in the Caspian and suggest possible methods to achieve some measure of balance between oil production and the environment. This paper proposes that given the constraints inherent in setting effective environmental policy in the Caspian and the nature of the environmental impacts of the oil industry, a certain amount of command-and-control regulation is warranted. There is also room for market-based environmental regulations in the Caspian. In order to achieve environmental quality, the Caspian nations must work

together to prevent oil development in the region from harming the Caspian ecosystem. However, the politics of the region are a major obstacle to negotiating a treaty. Yet, if the governments of the region cannot agree it is possible that the local environmental groups of each country can. These groups could play an important role by working with each other and international oil companies to achieve environmental goals.

ENVIRONMENTAL CONCERNS

The Caspian is home to a great variety of rare and unique species. A subspecies of seal is found only in the Caspian, and the largest bird of prey in Europe, the rare white-tailed sea eagle, makes the Caspian its home. The northern wetlands area is home to 256 bird species, 58 fish species, and 33 mammal species. The sea also provides wintering grounds for rare visiting birds, such as the flamingo and the purple swamp hen (Cox and Norlen 1999).

Offshore drilling impacts the environment at every stage of its production. Seismic testing, which involves large undersea explosions, can injure or kill marine life. Pollution from by-products of the drilling process and accidental oil spills can also hurt or kill marine life and introduce toxins into the food supply of animals and humans. Abandoned infrastructure and air pollution from gas flaring are other impacts of the drilling process. Environmental groups also argue that increased oil availability and use will heighten the consequences of global climate change (Rowell 1997).

Several features of the Caspian Sea make the sea especially sensitive to environmental impacts from oil drilling and further complicate environmental policy-making. The “other black gold” — caviar-bearing sturgeon — biodiversity issues, and the peculiar natural characteristics of the sea all have important implications for any regional environmental policies.

Sturgeon: the Other Black Gold

Ninety percent of the world’s sturgeon catch, from which most of the world’s black caviar is produced, is from the Caspian (Rowell 1997). Caviar has long been and continues to be a major export and source of domestic income for all the Caspian states. Poaching, over fishing, and pollution are causing sturgeon populations to decline and local environmental groups fear that expanding oil-drilling activities in the area will only worsen the situation. They also point out that while sturgeon are a renewable resource that will last forever if harvested properly, oil fields will eventually run dry (Zilanov 1997).

Sturgeon health and survival are not just purely economic or aesthetic concerns; they are public health concerns as well. Residents who live along the shores of the Caspian regularly eat sturgeon and other fish from the sea. As sturgeon live to be up to 100 years old and are bottom feeders, toxins can build up and become concentrated in their systems for years before they are eaten by humans. The human bloodstream then absorbs the toxins from the fish (Zilanov 1997).

Confined Waters

Because the Caspian is non-tidal and confined, it cannot absorb pollution as an open ocean can. In a body of water like the Caspian, oil spills can remain localized, becoming a greater threat to marine life than if they were broken up and dispersed by a rough sea. When drafting environmental impact assessments for activities in the Caspian Sea, oil companies need to be careful about using data from the North Sea or other less-confined seas. Threshold levels of pollution (the amount of pollution an activity can legally release) may need to be lower in the Caspian than in other offshore drilling areas because of the sea's confined nature (Cox and Norlen 1999).

The Water Level Puzzle

An environmental concern peculiar to the Caspian is its mysterious rising and falling sea level. Between 1930 and 1977, the Caspian's water level fell by 2.5 to 3 meters. After 1977, the water level began to rise again, and since then it has risen by 2.5 meters (Espenov 1999). Scientists have so far been unable to discover the cause of the changing sea level. The ecological effects, however, are clear. The rising waters have flooded many industrial projects, sweeping their pollution into the sea. The sea level has also added stress to shorebird populations by submerging their shallow wetland habitat. Any new industrial project needs to take into account the rising sea level and possible reversal when designing infrastructure (Cox and Norlen 1999).

Seismic Considerations

The area encompassing the Black Sea and the Caspian, from Turkey's western shores to the Turkmen deserts, is an earthquake zone. Devastating earthquakes in Turkmenistan in the 1950s, Armenia and Iran in the 1980s and the most recent earthquake in Turkey in the August of 1999 are some examples of how vulnerable the area is to earthquakes. Oil transferring stations, underwater and aboveground pipelines and drilling platforms are all vulnerable to earthquake damage. When designing and building these

structures, precautions should be taken to ensure that they are earthquake proof.

Decades of Pollution

Local and international environmental groups point out that the Caspian's ecosystem has already suffered decades of abuse and is in need of recovery, not additional stress (Motavelli 1999). Decades of lax environmental controls have dumped dangerous toxins into the Volga River, the main source of the Caspian, and into the sea itself. Scientists estimate that each year an average of 60,000 metric tons of petroleum byproducts, 24,000 tons of sulfites, 400,000 tons of chlorine and 25,000 tons of phenols are dumped into the sea. Concentrations of oil and phenols in the northern sea are four to six times higher than the maximum recommended standards. Around Baku, where oil drilling and industrialization have been happening for almost a century, these pollutants are ten to sixteen times higher ("Details" 1998). Local environmental groups fear that, domestically, the wanton destruction of the Caspian's natural treasures has already begun. They point to a contract signed between the Kazakhstani government and a major oil consortium to explore for oil in a nature preserve as evidence of the Caspian governments' environmental apathy (Kushenov 1999).

Some analysts propose that environmentalists should welcome western oil companies to the Caspian. These companies with their environmentally safer technology will be an improvement over the Soviet oil industry (Motavelli 1999). This proposition however, is flawed for two reasons. The pressing issue is that more of the Caspian is being opened up for oil exploration than ever before and that the environmental impacts of new projects may irrevocably harm the region's already damaged ecosystem.

Furthermore, the environmental records of western oil companies in other areas of the world give environmentalists good reason to be concerned that these new players will be no better than the Soviets. Examples of severe environmental degradation and human rights abuses from oil companies in league with powerful despots abound. In Nigeria and Colombia, Royal Dutch Shell and British Petroleum have been accused of actually hiring assassins to murder people opposed to their actions (Rowell 1997). Indigenous groups from Ecuador and refugees from Myanmar are currently attempting to sue Texaco and Unocal in U.S. courts for environmental neglect and human rights abuses (UNESCO 1999 and *All Things Considered* 2000). These examples illustrate how oil companies have routinely ignored ecological and human concerns in their quest for crude.

POLITICAL FACTORS IN ENVIRONMENTAL PROTECTION

When the Soviet Union fell apart in 1992, suddenly five nations bordered the Caspian instead of two. Whereas before, the Islamic Republic of Iran and the Soviet Union shared the sea's riches, three more nations now want their share. The new nations of Azerbaijan, Turkmenistan and Kazakhstan all eagerly eye the Caspian and its hydrocarbon riches as a solution to difficult economic problems. These nations also see their possession of such a valuable export as insurance of independence from Russia (Blum 1998). Russia and Iran also understand the strategic and economic importance of petroleum and look towards the Caspian as leverage against the West and a way to reassert influence in the Central Asian region (U.S. Senate 1997). The West hopes that Caspian oil reserves will decrease its dependence on Persian Gulf petroleum and it hopes a strong western influence in the region will hinder Russia and Iran from controlling the region's energy resources (U.S. Senate 1997). The politics of the region and the presence of so many players make collective policy-making difficult, especially in the realm of the environment. In the Caspian, as elsewhere, environmental quality questions conflict with economic development. This conflict is intensified in the Caspian as economic development is also linked to sovereignty, independence and control over important energy resources. The current conflict over pipelines in the region is illustrative of the highly politicized atmosphere in which Caspian petroleum development is taking place.

Pipeline Politics

Potential reserves are not worth very much if the oil cannot get to market. Currently only one pipeline carries oil from the Caspian to the Black Sea. Oil companies have secured political support and financial backing for a new pipeline; however, the pipeline's route is fraught with politics, and these, in turn, have environmental implications.

The United States has publicly stated that it will not provide any financial backing for any proposed pipeline routed south through Iran and is campaigning to convince private backers that alternate routes are more viable (U.S. Senate 1997). One of these routes includes a pipeline that would run across the Caspian Sea itself. The large expanses of water a pipeline would have to cross, 310 kilometers, and the threat of earthquakes seem to create a recipe for an environmental disaster ("Details", 1998).

A pipeline through Russia is also unacceptable because the U.S. does not want Russia, a current but unpredictable ally, to control the Caspian oil resources. The other Caspian countries feel the same way, preferring to

curry favor with the United States in pipeline politics, rather than give Russia control over their prized export (Blum 1998).

However, the other alternatives are less than optimal. The route favored by the United States would run through the Caucasus and Turkey, ending in Ceyhan on the Mediterranean coast. Turkey favors this option because the pipeline would bring them revenues, and because oil in the pipeline would go straight to the Mediterranean and not be tankered through the Bosphorus (Blum 1998). Spills and accidents not only affect the environment, but the population of Turkey's largest city as well. Several oil spills have already occurred in the Bosphorus—one caught fire and burned for five days (Cox and Norlen 1999).

Small Sea or Large Lake?

A political question complicating environmental policy in the Caspian region is the disputed status of the Caspian Sea. The Caspian is large and saline, supporting the argument that it should be classified as a sea, and that the international laws which apply to seas would then also affect the Caspian (Blum 1998). The implications of this classification are that as a sea, the Caspian would be divided into separate territories for each bordering country. Classification as a sea would give greater security to those countries that wish to prevent Russia's hegemony in the region. On the other hand, because the Caspian is landlocked and there are no outlets to open water, the case can be made that the Caspian is a large and saline lake (Blum 1998). This definition most benefits Russia who may try to take advantage of the lack of international borders to reassert its dominance in the region. The distinction is important for any discussion of environmental policy in this region because until the Caspian's status is decided, it is unlikely that any sort of environmental agreements will be negotiated (Baku Memorandum, 1999).

Local Environmental Groups

The idea of local environmental groups influencing policy is beginning to take root in the Caspian states, although local environmental groups still have some way to go before they are a full player in the environmental policy-making process (Topoleva 1999). There are currently 50 environmental groups active in the five Caspian countries (Strengthening Partnerships 1999). Trans-Caspian environmental group activity in the Caspian so far has been limited, but it promises to increase. A recent conference in Baku sponsored by the Caspian Environment Program, U.S. Agency for International Development and the Institute for Sustainable Action and

Renewal in Eurasia, brought together local environmental groups from all over the region to discuss the impacts of petroleum development and corporations and strategies to work with the companies working in their countries (Strengthening Partnerships 1999).

CHOICES OF ENVIRONMENTAL REGULATIONS: MARKET-BASED INCENTIVES OR COMMAND-AND-CONTROL?

When choosing environmental policy, it is of course possible to create a strategy based on components of both command-and-control policies and market-based incentives. The next section will explore how each of these policies might fare in the context of petroleum development in the Caspian Sea given current environmental and political factors. For the purposes of this paper, efficiency will be defined as the highest level of environmental quality for the lowest cost.

Pollution Taxes

Many economists view polluter taxes and marketable pollution permits as an efficient method of environmental protection, but pollution taxes, where polluters pay taxes equal to the amount of additional pollution they produce, have an important drawback. Governments must decide what level of pollution is tolerable and determine taxes so that firms are provided an incentive to not pollute above that level (Kahn 1995).

In the Caspian region, there is some evidence that if governments choose to use pollution taxes, they may not set the tax high enough to reflect the social costs of petroleum exploration. There is little evidence that the oil revenues of the Caspian country benefit the citizens in the areas where petroleum extraction is taking place. Oil revenues in some countries have been spent on extravagant projects that paid out few economic benefits for citizens. For instance, the president of Kazakhstan spent enormous sums of hard currency building a new capital, while the elderly went without their pensions for months. Coastal communities, with the exception of Baku, the Azerbaijani capital, are generally poorer than the inland capitals (Motavelli 1999). This is disturbing since it is the coastal communities that depend on sturgeon for their livelihoods and will bear the greatest environmental costs of oil drilling.

Another problem in establishing a pollution tax relates to the peculiarities of the petroleum industry. Oil exploration and drilling is such a capital-intensive industry, especially in the initial stages, that setting an appropriate tax level would be difficult. Firms often lose money in the initial stages of exploration and drilling. Developing an oil field requires

high capital expenditures, and there are usually lengthy waiting periods of years before oil is struck and the companies have a product to sell. In this initial period, firms would seek to avoid the tax and prevent pollution to offset their losses. As profits increased after the oil began to be sold, companies would have less incentive to prevent pollution and avoid the tax. A government would therefore have to adjust the level of tax so that it would remain an incentive as profits increased.

Marketable Pollution Permits

Marketable pollution permits establish a system whereby a controlled number of permits to pollute are released onto the open market, either by auction or lottery. Firms then buy and trade the permits according to their needs. The idea is that those firms whose abatement costs are high can buy more permits and continue their current emission output, while firms for whom it will cost relatively little to further cut back emissions can sell their permits. Both types of firms benefit. High-abatement cost firms save money because permits cost less than pollution control. Low-abatement cost firms save money because reducing emissions costs less than buying permits. Society benefits because despite the trading aspects, there are only enough permits to allow a previously designated amount of pollution. In other words, although different firms release different amounts of pollutants, the total amount of pollutants released is the same as if every firm was regulated through the command-and-control technique (Kahn 1995).

Transaction Costs

Although marketable pollution permits are efficient and equalize abatement costs, there are still significant transaction costs. Determining an acceptable level of pollution to control for is a crucial component of the system and one that involves science and politics. This is especially true in trans-boundary situations where countries must voluntarily agree to limit emissions and there is no overarching enforcement authority to impose a program on regulated industries. Obviously, the target level of pollution will affect the overall effectiveness of the program. The level of pollution is only one important component of the initial design. Others include distributing permits and the geography of the system.

The geography of a firm's externalities is difficult to control in a system that depends on a firm's ability to choose its own best level of abatement. People living next to a firm that pollutes as much as possible will be worse off than the people living next to a firm that sold its permits and pollutes as little as possible. Unfortunately, methods to limit the social costs require

restricting the amount of permits that can be traded, thereby decreasing the efficiency and effectiveness of the system (Kahn 1995). Geography would be a problem in the Caspian. A portion of the Caspian is a national park, and sturgeon are more likely to breed in some parts of the Caspian than others (Cox and Norlen 1999). Firms that chose to buy permits over controlling pollution could wreak considerable damage on the ecosystem depending on where they were located.

Permits can be distributed by auction, lottery or some other scheme. Fairness and equity are important considerations at this stage so that firms begin on a level playing field (Kahn 1995). In order for such a system to work, a treaty between the five Caspian nations would be necessary. The high transaction cost of establishing a workable pollution permit trading system is a formidable barrier. The politics of the region and the Caspian's disputed status would make it difficult to negotiate a treaty that actually kept pollution levels low.

The connection between oil resources and sovereignty would come to the forefront of such negotiations. A complete understanding of the environmental effects of oil would be necessary in order to prevent one country from using environmental concerns to gain control over another country's oil resources. Of course, it is not impossible for countries that have strained relations with their neighbors to negotiate workable treaties. Here, local environmental organizations could play a vital role. Local environmental organizations from each Caspian country are already working together to solve the environmental problems of the Caspian Sea. A strong presence from a group of organizations that are already working towards common goals in the Caspian could make negotiations less contentious.

Command-and-Control Regulations

Economists generally perceive command-and-control techniques as inefficient because the costs of achieving low levels of pollution are generally very high. Additionally, regulations do not provide any incentive to reduce pollution levels beyond what the levels set by the government (Kahn 1995).

Despite these complications, there are some instances where command-and-control policies may be viable. Technological requirements are attractive environmental protection methods because they force firms to prevent pollution before damage occurs instead of paying fines after the fact. From an economic viewpoint, the costs of installing and using such technologies vary among firms, so this solution does not provide the most

environmental protection at the least abatement cost. In addition, such requirements do not provide any incentive to develop new and cleaner technology (Kahn 1995).

Examples of technology specifications range from requiring certain scrubbers on smokestacks to requiring that shrimp harvesters use turtle-safe shrimp traps. In the oil industry, environmental groups propose a few environmental “best practices” that should be required in the Caspian Sea. One of these is a method known as “downhole disposal” to dispose of produced waters – a byproduct of oil drilling that is a mixture of crude oil and water. It is certainly easier and cheaper for oil companies to jettison this water out to sea. However, environmentalists and the U.S. Environmental Protection Agency consider re-injecting this mixture back underneath the earth as a more environmentally safe disposal method (Gao 1999).

Another method recommended by environmentalists is the use of water-based drilling muds that are less toxic than synthetic-based drilling muds. Environmentalists encourage the use of non-toxic vegetable oil instead of refined oil as a lubricant during drilling, although vegetable oil does not work as well or last as long (Gao 1999). A last technological specification would require double-hulled tankers in the Black and Caspian Seas (Cox and Norlen 1999).

There are several arguments for requiring that oil companies jettison less produced water or re-inject it, use vegetable based oils and water-based drilling muds, build infrastructure to withstand earthquakes and adopt other technological standards. The societal costs of bearing the externalities associated with higher concentrations of pollution are quite high in the Caspian pollutants due to the confined nature of the sea. The Caspian’s other natural resource, sturgeon, must also be protected. Technology standards for both basic pollution prevention and standards that will help avoid catastrophic oil spills are therefore auspicious.

Transaction Costs

In most cases, transaction costs for a technology specifications policy would be fairly low. Negotiating oil contracts takes several years and environmental impact statements and emergency response plans are already a component of these negotiations (Gao 1999). In most cases in the Caspian, there is no existing infrastructure to support planned petroleum extraction. Firms can incorporate the required technology while developing a site instead of spending money on expensive retrofits. In cases where projects are already underway, transaction costs could be

high. Enforcement would entail ensuring that the oil companies utilized the required technologies.

A solution to the seemingly adversarial goals of ensuring a certain amount of environmental protection while still providing incentives for firms to develop new technologies is to require that firms reach a certain level of pollution prevention, but allow them the freedom of using their own technologies. For instance, the law would specify that produced waters could not be disposed into spawning grounds, and the firm would be responsible for deciding how to achieve this goal at the least cost to them. A firm could decide if it was more cost-effective to re-inject produced waters back into the seabed or recycle the waters. New and innovative technologies would need to be reviewed by a committee and gain approval before a project began. However, this would imply relatively few transaction costs since firms are usually required to submit environmental impact reports and emergency response plans before projects begin (Gao 1999).

Avoiding catastrophic accidents and oil spills is good business for oil companies as well as best practice for the environment. Accidents and spills can injure a firm's employees, cause the firm to forego profits from the lost oil, cost a firm money in lawsuits and clean up, and can permanently harm a firm's public image and harm relations with the host government. Proper emergency response plans that require technical details for pollution and accident prevention can meet the needs of both oil companies and environmentalists.

Free-Rider Problem

Because each country is responsible for negotiating oil contracts on its part of the Caspian, there is the possibility that some countries may not require firms to avoid certain levels of pollution or not give emergency response plans the proper scrutiny. Countries may be so eager for foreign investment that they will require little in the way of environmental standards from oil companies. Here again, local and international environmental groups could play a role. There is little evidence that firms are attracted to countries with weak environmental laws (Levinson 1996). Furthermore, the location and size of hydrocarbon resources are a much more important factor in oil company location decisions. Local environmental groups could use this evidence to convince their governments that strong environmental regulations and oil development are both possible.

Because many oil companies working in the area have activities in more than one country, international finance institutions could be a part of a

solution to the free rider problem. Organizations that are actively lending in the area such as the European Bank for Reconstruction and Development (EBRD) and the World Bank could insist that all their projects adopt the same pollution prevention standards in every country.

Local environmental organizations could be part of a potential solution here as well. Working together on behalf of the sea, these organizations could use their power with the public to embarrass companies that are using a better environmental method in one country to apply the same technology in the second country.

Environmental groups are finding some success in using public pressure to convince oil companies to follow proper environmental procedures. In 1995, pressure from environmental groups forced Shell U.K. Exploration and Production to change its plans to abandon an old North Sea oil rig at sea and spend a considerable sum disassembling it and disposing of it elsewhere (Knott 1997). Companies are also realizing that a bad image can cost them money. After Shell's abuses in Nigeria came to light, a group of its stockholders adopted a special resolution calling for an improvement in environmental accountability and business ethics. These stockholders argued that a bad public image was bad for business (Gao 1999). Since environmental groups can influence company policies, as happened in the U.K., local environmental groups in the Caspian could act as effective monitors and influence technological standards.

CONCLUSION

The oil industry is a messy business, but it provides an essential ingredient to our daily lives, and until viable energy alternatives are widely used, oil will continue to be a strategic commodity for many countries and oil companies and environmentalists will continue to clash. In the Caspian, it has become clear that oil production will take place. However, the degree to which the environment is harmed is under the control of governments and local environmental groups, and coastal communities. An accident or oil spill in the Caspian would severely harm an economic resource of the coastal communities, and as an inland sea, the Caspian is more vulnerable to oil spills and pollution. There are also many dangers of the Caspian such as its seismicity and extreme variations in water levels that make the chances of accidents more likely. Therefore, command-and-control techniques, in the guise of technology specifications, are a valid tool in setting environmental policy. An important aspect of these specifications, however, is to provide incentives for firms to develop better technologies. This

can be done by setting pollution thresholds and allowing firms to devise their own methods for controlling pollution.

Market-based incentives could also work in the Caspian; however, the forces driving policy in the region today make agreement among the Caspian states difficult. Taxes may be viable, but governments would have to alter the tax in accordance with oil company profits in order to provide a correct incentive.

Local environmental groups are an essential part of any strategy that attempts to balance petroleum extraction and environmental protection. Local environmental groups can help their governments understand the true costs of bearing the externalities of oil drilling on the coastal communities. They are not bound by the political constraints that bind governments. Therefore, there is a better chance that these groups can work together in a Trans-Caspian environmental program than the Caspian governments can. These groups can also have considerable power in using public opinion to change the behavior of oil companies.

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