Perceptions on Deep Shale Gas Exploration at Allegheny College

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Abstract

Within the past decade Allegheny College has worked hard to establish a green initiative. With support from students, faculty, and the local community, the college has been able to create a zero carbon plan for 2020. Part of the plan has been completed with the renovated Carr Hall building. Having a new and revamped environmental program gave confidence to the community that this goal could be reached. Over the last year, the sustainability promise that the college has proposed has been compromised by a relatively new style of natural gas extraction called hydraulic fracturing. There has been ongoing debate for the potential for this process to occur on Allegheny's Bousson Experimental Forest. The process of hydraulic fracturing has many externalities that result from the process, and bring up problems that political ecology can help to explain. To get a better understanding of the college community's opinion of whether Allegheny should proceed with deep shale gas exploration or not and why, a survey of students, faculty, and administrators was conducted. Our results showed that people's opinions were generally against hydraulic fracturing, and were influenced by social, economic and environmental factors. This shows that the Allegheny College has a social, economic, and environmental commitment to not use hydraulic fracturing on its land. If they do, they are disregarding the opinions of their stakeholders and negatively influencing the community and environment they claim to care so much about.

Keywords: Deep shale gas, hydraulic fracturing, political ecology, Allegheny College

1 Introduction

Ever since its establishment in 1815, Allegheny College has prided itself on being "wonderfully weird". Today, the small liberal arts college aims to provide students with "unusual combinations" in order for them to express themselves freely. With such support, one can say that Allegheny College goes to great lengths to make sure that not only the institution itself is stimulated, but so are the needs of the students. One initiative the school has taken in order to benefit itself and the campus community is a sustainability commitment. The college explains it's sustainability initiatives as:

> This commitment is evident as rain gardens, environmental community art, a comprehensive composting program, a green roof, LEED ®certified buildings, geo-exchange heating and cooling, porous parking lots, wind generated electricity, an annual campus wide energy challenge, and a Climate Action Plan to achieve climate neutrality by the year 2020.

Various groups have shown increased support in hopes of helping the college meet such a goal. One large group on campus that has showed its support is Allegheny Student Government (ASG). The new sustainability coordinator of ASG stated: "Hopefully, people will get involved in ASG in general, but hopefully in sustainable initiatives as well (McHugh, 2012)." hoping for more involvement in order to reach the goal set for 2020.Having set high expectations for the college and its environmental initiatives, various groups have been formed in order to communicate opinions on issues that arise at Allegheny College.

One issue that is currently causing much controversy throughout the college community is the possibility of deep shale gas exploration (also known as hydraulic fracturing) in the college owned Bousson Experimental Research Reserve. The 283 acre reserve consists of "woodlands, ponds, streams, wetlands, diverse habitats, and native wildlife (Allegheny College 2013)." and is used for both students and faculty for research. Leasing consultants have approached the college on the possibility of deep shale gas exploration in the reserve. Since then here has been a sudden eruption of groups formed that have an array opinions on hydraulic fracturing. The Bousson Advisory Group was set up as a response to gather facts and have campus wide discussions, forums, and debate on the issue. According to their website, "the group will provide a set of opinions, a summary of campus view points and survey data to inform the Administrative Executive CouncilâĂŹs recommendations to the Board of Trustees (Allegheny College 2013)".

Perceptions and opinions of hydraulic fracturing are varying on campus, but "a lot of people on campus think it's a terrible idea, that it goes against everything Allegheny has risen to represent these days, which is an eco-friendly approach to resources" . (Deurig 2013). With an environmentally friendly curriculum and a goal set for the future, many community members have made it their priority to make sure their opinions are heard. Roughly 40 of them engaged in a sit-in in front of Quigley Hall. The sit-in was intended to engage more faculty in the discussion (Duerig 2013). These students' argument revolved around the adolescent nature of hydraulic fracturing technology and the fact that the industry plans to dig for gas in an area intended for scientific research by both students and faculty. This sit-in gave the students a chance to voice their opinions against hydraulic fracturing, but the faculty was not able to voice theirs.

On one side are the students such as those who organized the "no green slime event" with speakers from the Pennsylvania Independent Oil and Natural Gas Association (PIOGA). This event spoke about the value of hydraulic fracturing and amassed a group of students who are in support of the drilling and seem to be under the impression that students in favor of hydraulic fracturing are a misrepresented majority (Kochik 2013). The event consisted of presentations followed by a panel question and answer session. The speakers included Lou D'Amico, president of PIOGA, Burt Waite, senior geologist at Moody and Associates, and Bob Garland from Universal Well services. They discussed about how hydraulic fracturing is safer than other kinds of drilling and natural gas much less environmentally degrading than coal. This helped to inform the students who were uneducated about hydraulic fracturing to learn about

some of the potential benefits to the process rather than only the potentially devastating consequences that had been talked about previously on campus.

In the middle are the people who are undecided or have no opinion on the matter. One huge player in the way the surrounding community perceives hydraulic fracturing and Allegheny's decision to proceed with hydraulic fracturing is Allegheny's own President James Mullen. Having such a high stature and rank in the college, a lot of people within the community look to President Mullen for a sense of approval or insight on major situations that go on throughout campus President Mullen has assured community members that this decision is not an easy one, nor will it be biased by stating:

> When you make a decision like this and go through the process, you make your decision [based] on a number of factors. First, Allegheny has an incredible commitment that we're proud of to environmental stewardship. And we have guiding principles here. That informed decisions on the campus across the board: programmatic, construction decisions, so we're going to begin by saying that whatever we do we are going to be loyal to our environmental ethos here.We don't know the dollar value that we might be under Bousson. This is not going to be a decision based on dollars, and we won't know what is there in terms of dollar value until this process continues to play out (Stephenson, 2012).

With such a variety of opinions within the community at Allegheny College, it is hard to pinpoint how people truly feel about such a heated topic such as hydraulic fracturing.Because of this, it is crucial that we make an attempt to find out peoples concerns and wishes about the potential of hydraulic fracturing on Allegheny College's land. This project aims to gauge the perceptions surrounding hydraulic fracturing among in the Allegheny college community. To do this, we surveyed faculty, students, and staff at the college. In addition, we engaged in participant observation.

2 Background

Natural gas usage is hardly new. For years natural gas has been extracted from sites where it was found along with oil. Because there are difficulties surrounding the transportation of natural gas away from the site and to the consumer, it has been slow in trying to catch up with other types of energy. Natural gas has many advantages: it burns cleaner than coal or petroleum fuel and can be found in the majority of the states in large quantities. Historically, natural gas was only harnessed when oil was being produced as well. Energy transitions take years especially when gas needs to be liquefied. It took about sixty years to begin shipping natural gas after its scientific discovery. Then it took another fifty years until the first commercial delivery and another fifty for natural gas to make up 30% of the global gas trade (Rostand, 2011). During his Presidency, Carter declared that we were running out of natural gas and oil and needed to start a third phase in United States energy: permanent renewable energy solutions (Carter, 1977). Little did he know, we would discover a process like hydraulic fracturing to find more natural gas, slowing the transition to renewable energy all together.

A new advancement in natural gas extraction is deep shale horizontal hydraulic fracturing. This is a technique to extract natural gas from shale by injecting fluids and sand into the cracks of the shale, thus forcing them apart making the natural gas and oil easily accessible. This occurs below 7,000 feet and usually after a new oil well has been dug. Once the vertical drill gets through the shale, it turns horizontally at about 5,000 to 10,000 feet below the ground. Once a horizontal section is drilled, explosives are placed along the section at intervals. After the explosion, sand and fluids are injected at high pressure into the explosion sites, which then releases natural gas. This process has been growing exponentially since 2009 and is causing major economic, environmental and political disputes throughout the country (A Brief History of Hydraulic Fracturing, 2013). Because of the hydraulic fracturing boom in 2009, natural gas prices have again declined from 8-12 USD/MMBtu in 2008 to 3.5-9 USD/MMBtu in 2009 (Natural Gas, 2008). Due to this dramatic price drop, natural gas has begun to establish new, local economies and

provide an energy alternative cleaner than coal. Because of the local abundance of natural gas, states have facilitated natural gas extraction commonly known as 'fracking' (Clarke 2012). Hydraulic fracturing has benefits and consequences. The main potential benefit of hydraulic fracturing is economic because of both the locality of the natural gas, local economies are booming and expand. However, the expanding industry is leading to environmental consequences.

Economically, hydraulic fracturing has created local jobs and helped local and the national economies. In 2010, the hydraulic fracturing industry generated $76 billion towards the United States' gross domestic product and created 600,000 jobs (Bradley, 2012). Besides creating jobs and income for the United States, it is also creating domestic energy. As a country, we have been trying to move away from foreign oil dependence for years and this seems like the way to do it, whilst creating jobs in the process. Natural gas is in abundance all over the United States allowing for what seems to be an endless supply of natural gas. In addition, this process will not only fill our energy needs as a country but can in fact help to meet the high global demand for energy as well. But, even with local economies booming, it is hard to make up for the initial cost. Each well alone costs between three and five million dollars, and that does not include the five acres of the land that need to be cleared and leveled for the well (Bradley, 2012). This potential environmental degradation does not outweigh the economic advantages in such small towns.

There are environmental consequences are created by this industry. Due to the increased drilling for more natural gas production, the environment has become disposable. When these temporary economies bust, natural gas extraction companies try to over-extract natural gas causing unintended issues. The groundwater has been continually contaminated around these sites and the clearing of the land for the wells destroys ecosystems and habitats. Natural gas is considered to be a "clean energy", especially in comparison to coal because of the minimal greenhouse gas emissions from burning the gas. Although methane is not directly produced from burning natural gas, it can be released through fugitive emissions. Fugitive emissions include equipment leaks, process venting, and disposal of waste (Natural Gas, 2008) during the extraction process. Natural gas emissions account for 22% of United States' greenhouse gas emissions most of which is CO2 from burning the gas, followed by methane from fugitive emissions. Globally, natural gas caused 19.9% of worldwide greenhouse gas emissions in 2009 (Natural Gas, 2008). The United States is not the only country using hydraulic fracturing, but it is the country in which it is most popular. By politicizing hydraulic fracturing, legislation has been brought to the table regarding these concerns in an attempt to regulate hydraulic fracturing and lower the negative environmental impact.

Hydraulic fracturing is becoming more than an environmental issue and has begun leaking into the United States' political scene. During the 2012 presidential election both candidates agreed that hydraulic fracturing could be essential to cleaner energy. However, Mitt Romney campaigned on individual state rights to regulate and run hydraulic fracturing wells while President Obama campaigned on federal regulations to keep natural gas exploration and extraction safe and pollution free (Eggerts 2012). Environmental groups have been pushing for federalization of hydraulic fracturing regulations to help reduce pollution and protect communities from lackadaisical hydraulic fracturing regulations (Rabe 2012). In Pennsylvania, the legislation is broad and focuses on maximum extraction, disregarding environmental degradation since there are no federal regulations on hydraulic fracturing on the Marcellus Shale (Wiseman 2009). These issues are just as much political as they are environmental and will help expand research on hydraulic fracturing and help the movement for cleaner energy.

By understanding the historical, economical, environmental and political context of hydraulic fracturing, we can contextualize the movements on campus and how they came about. At a local level, economic, environmental, and political movements are taking place in favor of and against hydraulic fracturing on Allegheny College land. Through our research, we hope to be able to understand the issues on campus and the perceptions of hydraulic fracturing in different departments and different student groups on campus.

3 Literature Review

According to Paul Robbin's, *Political Ecology*, political ecology is a "field of critical research predicated on the assumption that any tug on the strands of the global web of human - environmental linkages reverberated throughout the system as a whole (Robbins 2012)." Researchers in many different fields contribute to the studying of political ecology. Scholars of anthropology, forestry, development studies, environmental sociology, environmental history and geography all work together to answer some of the most prominent questions in political ecology. There are many different definitions of political ecology and challenges to it as well (Robbins 2012).

There are five dominant narratives within political ecology that help answer these political ecology questions. They attempt to explain how the environment is changed and exploited. The first theme is the degradation and marginalization theses which explains that environmental conditions (especially degradation) and the reasons for their change. Environmental degradation, which is imposed on marginalized people, is now explained through it's larger political and economic context. The second theme is the conservation and control thesis. It explains conservation outcomes and how efforts at environmental conservation are shown to have harmful effects and sometimes fail as a result. The third theme is environmental conflict and exclusion which explains the access to the environment and conflicts over exclusion from it by suggesting that environmental conflicts are shown to be part of larger gendered, classed, and raced struggles. The fourth theme explains the identities of people and social groups, especially new and emerging ones, through the environmental subjects and identity thesis. It asserts that political and social identities and struggles are linked to basic issues of livelihood and environmental activity. The last theme, political objects and actors, explains socio-political conditions through the idea that political and economic systems are shown to be affected by non-human actors and are intertwined together (Robbins 2012).

All of these thesis seek to explain something different but all have been created in an attempt to understand political ecology thoroughly. Because of this, we have chosen to explain our research of perceptions of hydraulic fracturing on Allegheny College's Bousson Reserve through the environmental subjects and identity thesis and the degradation and marginalization thesis. However, before we can attempt to explain these thesis we must understand the difference between apolitical and political ecology and how apolitical ecology fails to explain this movement on campus.

Political ecology seeks to describe the role of organized accumulation and distribution of resources. Through political features, it seeks to understand how it affects the welfare of society as well as understand the implications of sustainability of resource consumption. Political ecologists operate under the presumption that economies and politics can describe the ever-changing relationship between man and the environment. If a political ecology exists, as in a political description of environmental relationships can be articulated, an apolitical one should theoretically exist as well. The apolitical discussion phrases these problems with respect to factors such as modernization, population growth, and eco-scarcity.

Although somewhat difficult to extricate, in the scope of hydraulic fracturing, an application of these two ideologies must exist as well. Generally speaking, the political arguments would be of economic necessity as a political principle, in that the school needs the money in order to bolster our endowment or that hydraulic fracturing would destroy our green image. The apolitical reasons for understanding the role of hydraulic fracturing would focus on the need for oil to accommodate the needs of a burgeoning population or the waning value placed in the welfare of the environment.

3.1 Subjects and Identities Thesis

The environmental subjects and identities thesis understands environmental issues as products of institutionalized and power based management structures. According to this definition, it is not that people's beliefs lead produce new environmental actions, behaviors, or rules systems but that environmental actions behaviors or rule systems lead to a new kind of people (Robbins 2012). Philosophically speaking,

this theory understands power as preceding to knowledge. How this relates to hydraulic fracturing is most important with respect to the identities being created in response to the political decisions. Environmental subjects and identities thesis is an important tool for understanding the creation of social convention. Hegemony is an important concept as it is understood as a normal component to civil society and therefore an important tool as it exposes the values and interests of powerful actors and agents (Robbins 2012). This definition is largely drawn from Foucault's theories, namely his concept of governmentality :

> Doing the necessary critique of the common perceptions of "power" (more or less confusedly conceived as a unitary system organized around a center that is at the same time its source, a system that is driven by its internal dynamic always to expand); analyze it rather as a domain of strategic relations focusing on the behavior of the other or others, and employing various procedures and techniques according to the case, the institutional frameworks, social groups, and historical periods in which they develop (Foucault, 1997).

Among farmers and small scale producers directly in the Pennsylvania region that were a part of a survey documented by Stephanie Malin, it was observed that the consensus among the people who were most threatened by hydraulic fracturing overwhelmingly dismissed the environmental claims as not based on fact but based on irrational opinions (Malin, 2013). In the opinion of this survey the identities of the people who were to be greatly impacted by the drilling were relatively ambivalent to the potential health and environmental consequences. They were motivated to sympathize with the gas companies as they were prospected to represent an economic boom (Malin, 2013).

Charles Davis conducted a survey about regulating the Natural Gas Drilling Practices in Colorado and Texas. Texas is by far the largest producer of natural gas in the United States (Davis, 2011). In Texas, unexpected identities arose in that, the environmentalists aligned with the hunters and ranchers against the industrial forces. There was so much natural gas drilling in parts of Texas that those who normally sided with free market industrial faction switched to the environmentalists as the land was being dominated by drilling systems which increased the chance of environmental disaster. Colorado was a completely different case, where the politics are more diversified and the economy is not nearly as dependent on oil (Davis, 2011). Colorado has historically leaned towards being more business friendly. As of relatively recently, the influence of more liberally minded, environmentally friendly political figures have diversified the political arena. In addition to the diversity in the political sphere, is the lack of economic dependence on the resource (Davis 2011).

3.2 Degradation and Marginalization

The theory of degradation and marginalization is an important concept when examining the perceptions on hydraulic fracturing at Allegheny College. This theory seeks to explain why changes in resource management practices (sustainable to exploitation), changes in government intervention and increasing globalization lead to increasing poverty of marginalized groups and destruction of the environment through the use of unsustainable practices. In this case, this change comes from recent legislation that has opened up the Marcellus Shale for hydraulic fracturing in Pennsylvania. This change in legislation has led to the marginalization of local people who, for the most part, are not being economically compensated for the destruction of their local environment. While the landowners are paid large sums of money up front and receive royalties from all natural gas extracted on their land, the rest of the already poor community doesn't and this will lead to increasing differences between the haves' and have not's. By getting a better understanding of what people currently think about this situation, we can better understand how to go about discussing these problems with different stakeholders on how to minimize, or potentially eliminate, these negative externalities and problems associated with hydraulic fracturing.

A very important aspect of this discussion is that the hydraulic fracturing and the natural gas industry are exempt from several governmental regulations. This includes the federal government making the natural

gas industry exempt from the Clean Air and Water Act. This allows for the hydraulic fracturing fluid to have all the toxins that are in it, and for the storage and disposal methods to be less than adequate. The state of Pennsylvania has also prevented all lower legislative bodies from implementing any stricter regulations relating to hydraulic fracturing, and has imposed strict sanctions for anyone trying to do so. This is a concrete example of how government influence can lead to the degradation of the local environment, and marginalization (both economically and environmentally) of the local people. For these reasons, it is important that we understand the processes involved in hydraulic fracturing, and whether we as society believe that our relating governmental regulations are in everyone's best interests, or at least most of society's best interest.

Hydraulic fracturing at Allegheny College can be related to what happened with Shell Gas Company in the Niger Delta. Beginning in 1997, Shell began extracting oil from the Niger Delta with the government's permission. This brought in large amounts of money to Nigeria, but only to the majority ethnic groups, which were not the local groups living in or around the Niger Delta. This created problems when Shell's operations ruined the countryside, did not compensate the local peoples, and left them in worse economic conditions than when they arrived.At first, this lead to civil protests, but soon changed to violent and militarized protests that included the kidnapping of Shell employees and vandalizing of Shell property. There was also increased conflict between the ethnic groups that were either gaining from Shell's presence or being marginalized by it. The government then retaliated to the protests with armed guards surrounding Shell's facilities and assisting Shell in protecting their assets at the expense of their own citizens. This crisis left 30,000 people homeless and multiple people dead. Shell eventually left in 2006 due to bad press and rising expenses. In the end, the positive outcome of this situation was that Shell gained some revenue, and the social/political elites of Nigeria also gained a large amount of money. According to Elias E. Courson,

> This crisis is the direct consequence of endemic poverty in the oil-bearing communities of the delta, lack of socio-economic development, militarization of the oil-bearing communities, lack of stake/participation in the oil industry by oil-bearing communities, high unemployment, corruption and lack of democratic governance in the Niger Delta and Nigeria (Courson 2007).

This is a concrete example of what can happen when an outside company or industry links with a non-local government, whether it is state of national governments, and sacrifices the local people's land and economic abilities. This is very similar to what is happening on the Marcellus Shale. Outside companies have recently gained permission to extract natural gas from Pennsylvania land and compensate only a select few landowners and leave the rest of the community to pay for the damages. This is exactly what Paul Robbins is referring to when he discusses his degradation and marginalization thesis and can be applied directly to the potential situation at Allegheny College.

4 Methods

We surveyed the Allegheny College community to assess their perceptions on deep shale gas extraction.We asked respondents to select whether they agreed, disagreed or were undecided on whether or not deep shale exploration should be pursued in the United States in general and in the Bousson Reserve in particular. We also asked them the single most important reason impacting their decision. We collected data about whether the respondents were faculty, student or staff and the departments they were affiliated with. The survey was created in Google forms and then distributed to faculty through email and to students through posts on Facebook between March 27 2013 and April 15 2013.

We quantitatively analyzed the data to see what proportion of the respondents supported deep shale gas exploration both in general as well as in Bousson. In addition, we attempted to determine if there are any relationships between departmental affiliation, status (student or faculty) at college and support for

deep shale gas. In addition to the quantitative analysis, we qualitatively analyzed the answers to the open ended questions. We coded the data in order to determine the major themes in the responses. As with the quantitative analysis, we also tried to see if there are any relationships between the responses here and the departmental affiliation and position in the community. To maintain anonymity of the participants, we need to

We supplemented the survey by conducting participant observation at various fracking related events around the campus. These included a talk by the Pennsylvania Independent Oil and Natural Gas Association on February 27, 2012, a forum by the Bousson Advisory Group on April 3 inviting feedback from the community on the issue, as well as meetings by the Students for Environmental Action. For each of the events, we noted the the general position of the speakers on the topic as well as the reasons behind the decision.

5 Results

5.1 Quantitative Results

Our survey was taken by a total of 220 respondents. These included 66 faculty, 146 students and 6 staff members. These numbers represent about 42 percent of the faculty and almost 7 percent of the student body. Twenty five academic departments were represented. In addition, three students reported their departmental affiliation to be undecided while two did not report their affiliations. The Environmental Science department had the highest number of respondents at 48 (8 faculty, 37 students and 2 staff). Psychology had 24 respondents, Biology had 22, English and Political science both had 16 respondents and economics had 15.

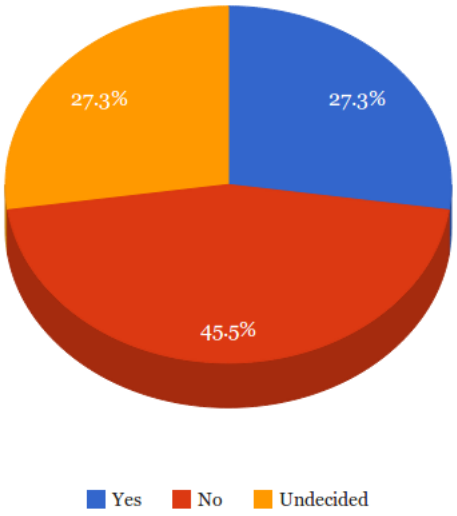


Figure 1: Overall support for deep shale gas exploration in the United States

Overall, the results indicate that 45.5 percent of the respondents did not support deep shale gas exploration in the United States (Fig.1). An equal percentage of people (27.27 percent) were undecided or said that they supported it. On the question of whether Allegheny should proceed with deep shale gas exploration in the Bousson Preserve, 59 percent of the respondents said no while 20 percent said yes and 21 percent were undecided (Fig.2).

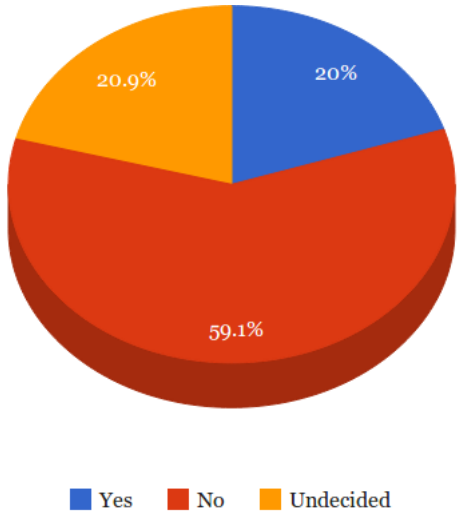


Figure 2: Overall support for deep shale gas exploration in Bousson Natural Preserve

About 75 percent of the respondents who did not support deep shale exploration in Bousson also did not approve of it in the US in general (Table 2). The answers did not deviate significantly from the overall results when compared within the student and faculty groups. 59.09 percent of the faculty oppose the deep shale gas exploration in Bousson, while 58.9 percent of the students do so (Fig.5.1). 21.21 percent of the faculty supported the exploration while among students the number was 19.86 percent (Fig.5.1). 60 percent of the staff opposed the project while 20 percent supported it . However, since the sample size for staff was only 6, these may not be statistically significant.

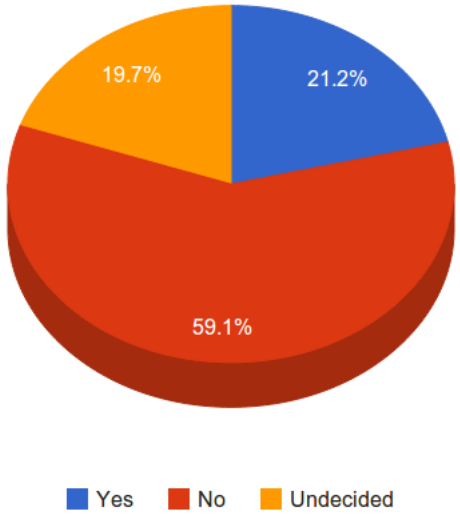


Figure 3: Support for deep shale exploration in Bousson among faculty

A department wide breakdown showed some interesting trends. Among the 48 respondents within the environmental science department, 64 percent were opposed to shale gas exploration at Bousson while within the economics department, 46 percent were opposed to the project (Fig.5). Within the faculty and

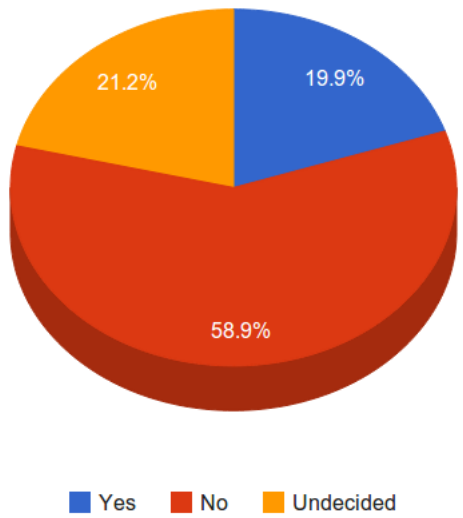


Figure 4: Support for deep shale exploration in Bousson among students

staff of the environmental science department, however, only 30 percent were opposed to the project while another 40 percent were undecided. This number is lower for the economics department with 20 percent against the project with another 20 percent undecided. The vast majority (73 percent) of the environmental science students were opposed to it. However, only 20 percent of the economics department students were against shale gas exploration in Bousson and with 40 percent for it. The geology department only had 5 respondents, 2 of whom were against it while 3 were pro deep shale gas exploration. Due to anonymity concerns, we cannot report a faculty student breakdown in this department.

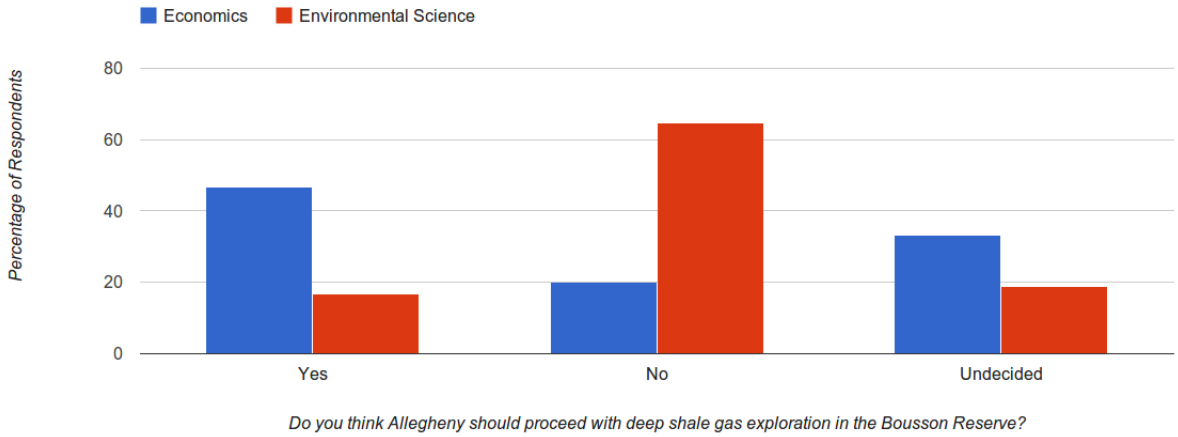


Figure 5: Support for deep shale gas exploration between the economics and environmental science departments

5.2 Qualitative Results

Through all of our research, we found trends throughout participant survey responses on what influenced their opinion of deep shale exploration/ hydraulic fracturing on the Bousson Reserve. For the perceptions of both the United States and Bousson Reserve, the same factors influenced people's decisions. Those trends can be found within different categories: social, economic, and environmental.

5.2.1 Social

Within participant responses there were various social aspects that people took into consideration when deciding their stance on deep shale exploration/hydraulic fracturing on the Bousson Reserve. A social aspect that many participants wrote about was the schools reputation and its sustainability initiatives. One biology student expressed that "it would be hypocritical of Allegheny to seriously consider hydraulic fracturing with it's goals to become carbon neutral by 2020. Plus, it would ruin the schools reputation as green." Another student, affiliated with the modern languages department, wrote: "Allegheny is an institution devoted to sustainability that is widely recognized for its sustainability initiatives. Drilling for natural gas at the Bousson nature Reserve would be a serious contradiction to this reputation..."

Another social aspect that was fluid throughout responses was community. One staff member wrote: "while the college community is rather transient, the community is not. It is unacceptable to give them the burdens of our actions." Many people mentioned the community and school together when forming their opinions. An English student stated: "Our school is dedicated to sustainability and community. [...] We are taught to be advocates for social justice, but that needs to include issues that are right here in our own backyard." The community seemed to be a huge factor in influencing opinions within the survey.

5.2.2 Economic

Another factor that influenced opinions of deep shale exploration on the Bousson Reserve were the various economic effects that could occur. Many people, from all departments, have mentioned economic factors throughout their survey responses. One Economics student brought up a point that many others seemed to relate to as well. The student wrote: "it is great for the economy and jobs and can help us be more independent..." Throughout the survey there were various responses that mentioned jobs, economic independence, and stimulation of the local economy from hydraulic fracturing. One faculty member, affiliated with the Economics department, put it into perspective. Some economic factors that influenced this faculty member's perception of hydraulic fracturing on Bousson Reserve included:

> Lower energy prices–a reverse energy shock, which has great potential to improve living standards, reduce unemployment, make domestic energy using sectors more competitive, and reduce our dependence on unstable and repressive producers of fuels overseas. [...] Funds derived from the gas could be used for important improvements in programs at the College.

This faculty member brought up various points, but one was parallel to many views of respondents; using the money from this process to benefit the college. Although many mentioned the economic gain, others felt that an economic boom might ultimately lead to a bust. Throughout responses from the survey, many people brought up utilizing the money that would come from hydraulic fracturing on the Bousson Reserve. One faculty member, affiliated with the Modern Language department, took as it far as to say that "We could lower the cost of tuition to students if we were to strike gas and get quite a bit of money." This along with many other economic factors played a huge role in influencing many perceptions.

5.2.3 Environmental

Another major trend displayed throughout participant responses in the survey were the various environmental effects that could potentially occur from hydraulic fracturing on Allegheny's Bousson Reserve. One Communication Arts student mentioned the widely debated effects of the chemicals used in the process could have on the surrounding ecosystems:

> The chemicals used in the hydraulic fracturing process are dangerous and potentially deadly to the ecosystems and everything in it. It would get into our groundwater and our drinking water and make the environment we live in an unsafe one.

Another student, affiliated with the Biology department, that mentioned environmental impacts stated: "benefits of using the opportunity to set a positive example for the community (and the many private landowners who seem to be independently in favor of it regardless of our decision) outweigh the potential environmental harms."

In addition to taking into consideration the potential environmental effects, many respondents also brought up the degradation of Bousson Reserve, and the lack of knowledge concerning hydraulic fracturing. A faculty member from the Chemistry department wrote: "I do not feel that the current regulatory environment is equipped to handle the oversight of such activities. As a result, I feel that cheap energy will come at the expense of degrading our environment and ecosystems." One faculty from the Psychology department feels as if there is "considerable knowledge of the processes and regulations and personal communications with professionals in the O&G development industry."

Although there may be varying factors that contribute to influencing people perceptions of deep shale exploration on Allegheny College's Bousson Reserve, there seems to be no concrete trend that defines how people feel on this issue, just overarching trends. By analyzing both qualitative and quantitative data, we were able to pinpoint various implications of perceptions throughout survey respondents.

6 Discussion

The quantitative data show that the general mood of the campus is against deep shale gas exploration in both the United States and Bousson natural preserve. This implies that in general the Allegheny community has a negative perception on the impacts of hydraulic fracturing. The breakdown by position at the college shows that the negative perception remains across the board from faculty to students and staff. The opposition among the environmental science department students is higher than the overall average. This is expected since we can assume that these students would have a greater concern about the potential environmental impacts of fracturing. Similarly within the economics department, the support for hydraulic fracturing was higher than average which could be explained by the fact that these respondents were likely to be more familiar with the economic aspects of the situation. Surprisingly, however, the opposition to deep shale gas exploration among the faculty and staff of the environmental science department was less than half the average. It would be interesting to explore the reasons behind the divide in opinion.

The replies to our survey ranged from strongly supportive to strongly unsupportive. The people who were for hydraulic fracturing on and off campus argued there were many economic benefits and limited detrimental environmental effects. Most also believe that since it is going to happen in this area anyway, we should take advantage of the opportunity to make money. On the other hand, most the people who are against hydraulic fracturing on campus and off campus argued the economic benefits, even if they are substantial, do not outweigh environmental problems. There were people who were undecided as well. These respondents tending to answer this way because of their lack of knowledge on the subject. This lets us know that there is a lack of education and available information for people on campus. It also allows us to understand the differences in these opinions and views on the subject of hydraulic fracturing. Within

our survey, we also found people who had extreme views about hydraulic fracturing and the effect it could have on campus. One respondent said:

> Hydraulic fracturing is wonderfully safe and extraordinarily profitable. Who's afraid of new advances in energy technology? As a side note, I'm one of many, many students who will enjoy seeing the environmentalists get steamrolled by the hydraulic fracturing juggernaut. There's absolutely nothing they can do to stop it, and I am so looking forward to them succumbing to incoherent despair. To those activists dressing up in those adorable little costumes and chirping about 'conversations', I'm sure a local elementary school would love to have you do an act in their annual talent show. Maybe once you get a reality check from the real world, you'll start behaving like real people

There were multiple things that we learned through the responses to our survey. Respondents were concerned about the school's reputation which implies that the reputation of the school outweighs the possible economic benefits. Also, there is evidence of the degradation and marginalization thesis in our results. Multiple people expressed their concern for the misrepresented communities and the lasting effects they will suffer if we decide to frack on our campus. This suggests that not just the green reputation of the college will be ruined but also the good reputation the college has with the surrounding communities. When it comes to the economic related answers, many people stressed the importance of the new economic ebenfits to Meadville. However, many people were concerned about hydraulic fracturing causing a "boom and bust economy" scenario. The environmental issues were based on ground water contamination and if there was going to be detrimental effects to the environment or not. Nothing really in between. This also implies there is not much education and available information for people on campus.

There were some shortcomings in our research that could be prevented in further research. First, when we sent out the email to faculty requesting their participation on the survey, we failed to include our methodology to keep anonymity. This resulted in a few people responding with a 'confidential' department. These results were omitted from our data and not included in our final number of participants. Another shortcoming in our research was the lack of staff responses to our survey. We only included a few on the email, by mistake, and did not realize this until after our survey was closed and the data analysed. We still received six responses which allows us to use their responses in our results. We also were only able to do the surveys online due to time restrictions and resource availability, but we do not think this impacted our results because of the many responses and the diversity within them. The last major shortcoming we had was the inability to survey the administration. Due to time constraints we were unable to do as we had planned in the beginning.

However, surveying the administration is a pathway to further research on the subject of the perceptions of hydraulic fracturing on college campuses. As well as including the administration, another idea for further research is to include the Meadville community as well, so they can be involved in the process of deciding whether or not to frack since it will be including their livelihoods as well. By investigating the effects of hydraulic fracturing on marginalized groups as well as perceptions of students and faculty, we would be able to make the best choice about hydraulic fracturing on Bousson. Because an Allegheny neighbor has signed a lease to privately hydraulic fracture, we, as a college, will be able to learn about the effects, positive and negative, hydraulic fracturing has on communities such as ours. This will be an opportunity for further research and to further understand the effects of fracturing in order to educate other people. Political ecology can only do so much to help explain why these new groups have been formed and why people view hydraulic fracturing the way they do but with further research, through political ecology and it's theses, these questions hopefully be understood further.

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8 Appendices

Appendix A

Perceptions on Fracking Survey

1. What department(s) are you affiliated with?

2. Are you a (please check one) :

Student Faculty Staff

3. Do you support deep shale exploration/ fracturing in the United States?

Yes No Undecided

4. What is the single biggest factor influencing your opinion?

5. Do you think Allegheny should proceed with deep shale gas exploration in the Bousson Reserve?

Yes No Undecided

6. What is the single biggest factor influencing your opinion?