To Breach or Not To Breach: Ethical Implications of the Lower Snake River Dams From the Perspective of Care Ethics

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On my honor as a University student, I have neither given nor received unauthorized aid on this assignment as defined by the Honor Guidelines for Thesis-Related Assignments.

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Introduction

When imagining the pacific northwest region of the United States, most envision lush forests, abundant rainfall, and flowing rivers. These rivers are an integral part of the infrastructure of the area, producing a very large percent of power consumed. The many dams over these rivers were constructed during the mid to late 1900s, when a nationwide boom in dam construction occurred. One of these power-generating rivers is the Snake River, a part of the larger Columbia River Basin, which runs through Idaho, Washington, and Oregon. The dams located along the Snake River are known as the Lower Snake River Dams, consisting of four dams. Construction was federally authorized and the United States Army Corps of Engineers (USACE) was tasked with creation. Unfortunately, these dams have had a staggering effect on native salmon, disrupting migration patterns and decreasing the population significantly. Environmentalists have been calling for deconstruction of the Lower Snake River Dams since the effects have been noticeable. However these dams are still standing, as the conflict has become stagnant and no progress has been made in several years.

To fully understand the stagnation of this conflict, the United States Army Corps of Engineers must be evaluated in their responsibility to care for the environment. Scholars have explored several aspects of the conflict, including the differing views of stakeholders concerning the economy, agriculture, the environment, transportation, and more. However, attention has not been adequately given to ethical aspects of the incident, such as the care the USACE held towards the environment. If ethical aspects of the incident are explored, engineers stand to gain a better understanding of their responsibility of care towards the environment, especially in an age of environmentalism. I argue that in the Lower Snake River Dams conflict, the US Army Corps of Engineers initially acted morally, but have tended towards immoral action recently due to their

changing views on attentiveness, responsibility, competence, and responsiveness towards this issue. I will examine the incident from the perspective of care ethics, which focuses on a moral obligation of care towards the self, others, and the environment. To support my argument, I will analyze evidence from energy replacement studies, ecological research, and environmental impacts of dams, which provide information about how the US Army Corps of Engineers has acted in the past and how their actions have affected the environment.

Literature Review

Due to the litigious nature of federal dam removal, several studies have been conducted concerning the debate of breaching versus keeping the Lower Snake River Dams. These studies evaluate the impacts of these scenarios in the context of several factors, including economic, social, and environmental. The debate on whether to breach the dams or not has become stagnant, with many attempts to compromise having impacts, but not enough to restore ecosystems. While several scholars have examined the factors creating the conflicts and attempts have been made to compromise, no consensus has been reached on the issue and the debate remains at a standstill.

Blumm's analysis of the conflict provides background information on the Lower Snake River Dams within the context of Idaho congressman Mike Simpson's dam removal proposal. This proposal, presented in 2021, is one of the first and more candid responses to the LSRDs that has come from a government entity. Due to this, it is very unlikely that the proposal will get traction; despite this fact, this is a beginning step in bringing attention to the issue. This new proposal prompted Blumm to perform in depth research of stakeholders, including Native American tribal culture, ecological conservation, barge transportation, irrigation, and infrastructure. Blumm also performed an analysis of the viability of the destruction of the dams,

calling for the citizens of Idaho to consider the possibilities of dam removal (Blumm, 2022). A description of the network is provided by Hilbert-Wolf & Gerlak. This article goes through several interactions between stakeholders to determine how the conflict came to a standstill. These interactions are affected by political dynamics and cultural dynamics, explaining the standstill of the conflict (Hilbert-Wolf & Gerlak, 2022)

Both studies provide very similar information on economics, sociology, and environmentalism. In addition to this, both sources place an emphasis on local voters as a means to dam removal, especially since the Lower Snake River Dams are a government project. Unfortunately, these articles fail to address the main actor in this conflict, the USACE, the engineers and maintainers of the dams. In order to fully understand the stagnation, the United States Army Corps of Engineers must be evaluated in their responsibility to care for the environment.

Conceptual Framework

My analysis of the Lower Snake River Dams conflict draws upon care ethics, which allows me to analyze the actions of the US Army Corps of Engineers and determine if they followed the ethical principles presented by care ethics. Care ethics is a branch of ethics emphasizing relationships and how these relationships shape our decisions. Alongside relationships, this ethical framework proposes that we have an ethical responsibility to care for our world, which can be applied to many situations, including the care for the self, others, a system, the environment, etc. (Sander-Staudt, n.d.). Care ethics has been scrutinized for its lack of clarity and definition of care and what constitutes someone as careful. However, in its process of development, Berneice Fisher and Joan Tronto developed a widely accepted definition of care, “a species of activity that includes everything we do to maintain, contain, and repair our ‘world’

so that we can live in it as well as possible. That world includes our bodies, ourselves, and our environment" (Fisher & Tronto, 1990, pg. 40). Later in the development of care ethics, Tronto goes on to define four conditions that constitute care, as summarized by Sander-Staudt, "(1) attentiveness, a proclivity to become aware of need; (2) responsibility, a willingness to respond and take care of need; (3) competence, the skill of providing good and successful care; and (4) responsiveness, consideration of the position of others as they see it and recognition of the potential for abuse in care" (Sander-Staudt, n.d.).

Using Tronto's four conditions of care, care ethics will be used to analyze the US Army Corps of Engineers ethical principles in the case of the Lower Snake River Dams. In the analysis that follows, I analyze the past actions of the USACE up to the current day and determine the level of care exemplified based on Tronto's four conditions of care and the change in that level of care throughout the past three decades.

Analysis

Environmental Care from 1995 to 2010

The conflict of the Lower Snake River Dams has been going on for decades, with initial protests coming to a juncture around 1995. This conflict has been enduring for the past 30 years and the different responses from the USACE can be split at the halfway mark, representing a change in care. Throughout 1995 to 2010, the United States Army Corps of Engineers, who built and maintain the dams, implemented several technologies and infrastructure changes to help lessen the impact the dams have had on the local ecosystem. These actions are an embodiment of care ethics, exhibiting attentiveness, responsibility, competence, and responsiveness to this environmental issue.

Proponents of dam removal are primarily environmental scientists, Native American tribes of the area, and conservationists. These groups have cited declining salmon populations as a concern since the 1980s and created a focus on the environmental impacts of the area. Included with this concern was the eventual addition of three species of salmon to the Endangered Species List, prompting the federal government to enact legislation to aid salmon migration (Blumm, 2022). When considering attentiveness in this situation, some may argue that the US Army Corps of Engineers was fairly unattentive, needing outside influence to prompt change. However, according to care ethics, "There is no intrinsic time limit to [attentiveness]" (Fisher & Tronto, 1990, pg. 41). Although the initial attentiveness was poor, following outside concern, the USACE was attentive throughout the process of creating their Environmental Impact Statement and throughout the following years, paying close attention to salmon populations.

Over a span of six years, from 1996 to 2002, the United States Army Corps of Engineers performed an Environmental Impact Statement on the four Lower Snake River Dams (LSRDs). This study analyzed four separate situations and their effects on local ecology, native tribes, and economy. These four scenarios comprised the following: Existing conditions; Maximum transport of juvenile salmon; Major system improvements to include adaptive migration; and Dam Breaching. The optimum solution to creating a healthy ecosystem was dam breaching, but due to economic consequences, this option was not chosen (United States Army Corps of Engineers Walla Walla District, 2002). However, the scenario including major system improvements to include adaptive migration was adopted and implemented. These adaptations consisted of infrastructure changes to allow for salmon migration, modifying the dams to allow for surface passage, juvenile bypass systems, spill operations, and improved fish ladders (United States Army Corps of Engineers, n.d.). Through this environmental impact statement, the

USACE admitted responsibility to the issue by using scientific knowledge to determine the environmental impact of the dams. Within the environmental impact statement, the US Army Corps of Engineers showed engineering competence, providing several engineering solutions to help alleviate the environmental stress the dams create.

Although the initial attentiveness was poor, the USACE were attentive towards environmental impacts later on in the dams' operation. Throughout this conflict, it can be said that the United States Army Corps of Engineers had an attitude of care towards the environment, although not at the immediate beginning, they tended towards ecological care. This has been shown by their attentiveness, responsibility, competence, and responsiveness in the past. Within the past several years, new research has emerged in the ecology sphere, presenting a new way of thinking about climate change and carbon emissions. For the United States Army Corps of Engineers to exemplify care, they must consider this new science and determine the best course of action, placing emphasis on their ethical responsibility to care for the environment.

Environmental Care from 2010 to the Present Day

Heavy environmental change had occurred on the Lower Snake River Dams, however around 2010, the USACE had begun to see little positive change in ecological health. This was a critical point in the betterment of the surrounding ecology and this is also where the United States Army Corps of Engineers erred. For the United States Army Corps of Engineers to exemplify care in their engineering practice, they have to evaluate their past decisions and perform the four virtues of care: attentiveness, responsibility, competence, and responsiveness.

The first step to ethical care is attentiveness, and in this situation the USACE needed to regard ecological statistics and new scientific literature on dams. Information that needed notice

include: literature on aging dams, general ecological impacts of dams, ecological impacts after the LSRD dam modifications, power replacement studies, and new nature based solution research. Literature on aging dams and their effects are abundant. The United Nations performed a report on aging water storage infrastructure, where concern for aging dams are stated. According to this report, signs of aging include “increasing cases of dam failures, progressively increasing costs of dam repair and maintenance, increasing reservoir sedimentation, and loss of a dam's functionality and effectiveness” (Moyer et al., 2018). Given this information and the ‘alert age threshold’ of dams being 50 years old (Perera et al., 2021), the Lower Snake River Dams (built between 1957 and 1975) are a cause for concern, not just for environmental effects, but for public safety and efficiency effects too.

Besides aging of dams, environmental science has been performed on the effects of damming rivers. When rivers are dammed, flooding and drying of areas occurs and reservoirs are created upstream. This flooding and drying fragment habitats, altering the local ecosystems and affecting native species (Rahman et al., 2022 & Gasparatos et al., 2017). Alongside ecological alteration, sediment transport is greatly affected. When there is stagnant water, high sediment collection occurs and due to an ecological process called eutrophication, low oxygen levels occur in the water. This in turn leads to even more ecological consequences, leaving riparian species with a lack of oxygen. (Schmutz & Sendzimir, 2018). When sediment is stored in these reservoirs, the flow of essential nutrients is restricted, causing a lack of essential nutrients downstream (Storch et al., 2022). These are general effects of dams on river ecosystems. Storch et al. describe the ecological impacts of dams along the snake river, where the Lower Snake River Dams are active.

Dams can negatively affect the “ecological assembly and function of riverine systems”. The snake river basin used to provide 50% of the whole colombia river basins salmon and steelhead population. This number presents a good opportunity to restore some ecological balance to the columbia river ecosystem without breaching a large number of dams. Specifically, the river lacks a healthy population of Sockeye Salmon, Chinook Salmon, Steelhead, Bull Trout, White Sturgeon, and Pacific Lamprey. Ecological repair due to dam breaching was studied in this research. These benefits include restored fluvial geomorphology, ecological processes, river flows, water temperatures, sediment transport, species diversity, and animal transport (Storch et al., 2022). There was a similar situation to the LSRDs conflict in Washington along the Elwha river, where two dams were breached. The breaching resulted in restored sediment dynamics, restored river channel and floodplain morphology, population increase of pacific salmon, recolonization of pacific lamprey, diet changes by native birds (American Dipper), and recolonization of Bull Trout. Storch et al. argue that these impacts give us a good idea of how the snake river will respond to dam breaching.

There have been several ‘power replacement’ studies performed on this conflict for many different stakeholders, including the NW Energy Coalition, a non-profit organization advocating for clean energy in the northwest United States, and the Bonneville Power Administration, a federal agency that distributes all of the federal hydroelectric power generated in the northwest United States. Both studies stated that the dams provide 2,300 MW of consistent energy and 900 MW of clean energy per year (Moyer et al., 2018 & Olson et al., 2022). In 2018, Energy Strategies LLC performed a power replacement study for the NW Energy Coalition, aiming to model different situations to replace power loss if the LSRDs were breached. Through their research they looked at several situations accounting for technologies and legislation and claim

that with replacement energy sources, there will be a lesser chance that the energy load produced by these replacements will be inadequate for the regional energy needed compared to keeping the Lower Snake River Dams up (Moyer et al., 2018). In 2022 the Bonneville Power Administration requested a power replacement study from Energy & Environmental Economics, inc in order to determine the worth of the LSRDs to the northwest power supply. EEE modeled several different situations and determined the power output of each scenario. In all scenarios, an emphasis was placed on the necessity for other forms of clean energy. *Figure 1* shows the results to make up for the missing carbon free energy produced by the Lower Snake River Dams. All six alternatives provided are viable in respect to power output, conveying the reasonable power replacement process if the LSRD's are destroyed. EEE places optimism on the progression of these emerging and improving technologies and seriously considers these technologies in all of their simulations (Olson et al., 2022).

Figure 1

Optimal Portfolios to replace the LSR dams

Table 10. Optimal portfolios to replace the LSR dams

Scenario	Replacement Resources Selected, Cumulative by 2035[29] (GW)	Replacement Resources Selected, Cumulative by 2045 (GW)
Scenario 1: 100% Clean Retail Sales	+ 1.8 GW dual fuel NG/H2 CCGT - 0.5 GW solar + 1.3 GW wind + 0.1 GW li-ion battery	+ 2.1 GW dual fuel NG/H2 CCGT + 0.5 GW wind
Scenario 1: 100% Clean Retail Sales (2024 dam removal)	+ 1.8 GW dual fuel NG/H2 CCGT - 0.5 GW solar + 1.4 GW wind + 0.1 GW li-ion battery	+ 2.1 GW dual fuel NG/H2 CCGT + 0.5 GW wind
Scenario 1b: 100% Clean Retail Sales (binding CES target)	+ 2.2 GW dual fuel NG/H2 CCGT + 0.1 GW li-ion battery	+ 1.8 GW dual fuel NG/H2 CCGT + 1.3 GW solar + 1.2 GW wind
Scenario 2a: Deep Decarbonization (Baseline Technologies)	+ 2.0 GW dual fuel NG/H2 CCGT + 0.6 GW wind + 0.1 GW li-ion battery	+ 2.0 GW dual fuel NG/H2 CCGT + 0.3 GW li-ion battery + 0.4 GW wind + 0.05 GW advanced EE + 1.2 TWh H2-fueled generation
Scenario 2b: Deep Decarbonization (Emerging Technologies)	+ 1.7 GW dual fuel NG/H2 CCGT + 0.6 GW nuclear SMR	+ 1.5 GW dual fuel NG/H2 CCGT + 0.7 GW nuclear SMR
Scenario 2c: Deep Decarbonization (No New Combustion)	+ 9.1 GW offshore wind + 0.1 GW wind + 1.0 GW solar + 0.3 GW geothermal + 1.5 GW li-ion battery	+ 10.6 GW wind + 1.4 GW solar

Note: Sourced from Olson et al., 2022

In the past decade, environmental scientists have heavily emphasized 'nature based solutions' as a solution to global warming, where nature is used to limit the effects and causes of climate change. Carbon sequestration is the collection and storage of carbon from the atmosphere. Emerging technologies, like carbon capture, have utilized this concept and performed well. However, healthy ecosystems also capture carbon from the atmosphere. In the case of carbon emissions, carbon sequestration by ecosystems is a nature based solution. These ecosystems are known as ecological carbon sinks, as defined by Fu and Xu; "Ecological carbon sinks refer to the process by which natural ecosystems, such as forests, grasslands, wetlands, and

oceans, absorb carbon dioxide from the atmosphere and store it as plant tissues and soil organic matter" (Fu & Xu, 2023). This is made possible through ecological factors, including water, nutrient cycles, biodiversity, and climate (Fu & Xu, 2023). In the 1970s, China proceeded with six large-scale ecological restoration processes. A study performed by Lu et al. analyzed the efficiency of carbon sequestration in restored ecosystems. China's forest carbon biomass has increased by 40% from the 1970s to the 2000s, representing the ability of these restored ecosystems to store carbon from the atmosphere in the ecosystem, helping alleviate the impact carbon has on global warming. The authors specifically stated that "findings show that the implementation of national restoration projects is the foremost factor leading to an increase of C stocks in the project regions" (Lu et al., 2018). This is critical information in regards to carbon storage and proves that ecological carbon sinks are a viable alternative to ecologically harmful infrastructure. When applied to wetland ecosystems, like those inhibited by dams, carbon storage potential increases. In the ocean, aquatic plant ecosystems contain more than 50% of marine carbon reserves while only taking up less than 0.5% of the seafloor area. Aided by water's ability to store carbon, aquatic plants play an important part in carbon sequestration in riverine systems. The process consists of photosynthesis by the plants, carbon allocation to the plant, excess carbon deposition into the river, which then carries it off into the ocean (Guo et al., 2025). This process shows great potential for carbon sequestration due to healthy ecosystems.

Plenty of new science, research, and analyses have been produced in the last 15 years and I have shown that unfortunately the USACE has been unattentive to these, giving way to these engineers not exemplifying environmental care. To give where credit is due, the US Army Corps of Engineers were attentive to some issues, giving way to proponents of the dams to believe the USACE has held care for the environment. These issues include harm induced to fish due to

turbines and heating of the river water due to the dam's coolant system. In response to these effects, the United States Army Corps of Engineers implemented "improvements to turbine design and modified operations to improve fish survival through the turbines" and temporary cooling systems along the dams until permanent cooling systems could be constructed. These permanent cooling systems were built and are in place to aid the conservation of fish populations (US Army Corps of Engineers). Unfortunately, these are the only two instances post 2010 of dam modification in an effort to aid fish populations.

Although the USACE were able to implement some strategies in an effort to aid local ecological processes, it should be noted that these improvements actually express an egregious disrespect towards care ethics. The United States Army Corps of Engineers were alerted of an issue and engineered a solution to this issue. These represent the four steps of care ethics, attentiveness, responsibility, competence, and responsiveness. The USACE were attentive to the issue of ecological damage, took responsibility for their actions by engineering a solution, created a competent solution, and implemented the solution in a responsive manner. Although this is great in regards to the issues caused by turbines and water heating, this shows that the USACE is capable of attentiveness, responsibility, competence, and responsiveness, but they are unable or unwilling to fulfill these actions and accomplish environmental care.

According to care ethics, the United States Army Corps of Engineers has the responsibility to care for the environment given their management of the Lower Snake River Dams. Given the proven effects of dams on local ecosystems and the benefit that nature based solutions provide, the USACE must be attentive to the new science and technologies being developed to determine the best course of action. The United States Army Corps of Engineers has previously demonstrated their competence and responsibility towards the issue through

alterations of dam infrastructure to aid fish migration. The last and crucial step towards achieving care, specifically for the environment, is responsiveness. The USACE must be responsive to the information provided to them through literature on the issue of the Lower Snake River Dams to achieve environmental care. Whether that be dam breaching or through more infrastructure change (Schmutz & Sendzimir recommend sediment management and a pseudo-natural fish bypass system), the United States Army Corps of Engineers need to be responsive to this issue in order to fulfill their responsibility to caring for the environment.

Conclusion

The Lower Snake River Dams conflict is a complicated situation, with many factors coming into play. However, because this project is an environmental one at heart, due to the nature of clean energy, the largest concern is the environment. Especially since this is the case, the engineers of the LSRDs have an ethical duty to care for the environment. To do so in this situation, environmental factors must be seriously considered and paramount to decision making. I argue that in the Lower Snake River Dams conflict, the US Army Corps of Engineers initially acted morally, but have tended towards immoral action recently due to their changing views on attentiveness, responsibility, competence, and responsiveness towards this issue. When considering the tradeoff between clean energy with harmful infrastructure and ecological restoration without renewable power replacement, all factors must be considered, however attentiveness, responsibility, competence, and responsiveness towards the environment need to be considered at a high degree.

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