

The Legal Dilemma for Environmental Democracy: Application of Blue Engineering

Raj Vedhanth Gurumurthy, 5577306

Under the supervision of

Dr.ir.Martine Rutten

Associate professor Water Management and Climate Adaptation at Delft University of Technology

Abstract

Compliance through deterrence is the major criteria for the implementation of environmental laws. The study conducted by Jerry and Amy, (2023), showed that this compliance through deterrence was implemented only to not allow the violator to have an economic advantage over the non-violator. The data obtained in the study, indicated that fundamental problems existed in the calculations of these deterrence methods which were by and large monetary penalties and in the worst-case scenario, incarceration. This study, challenges this system of litigating and decision making on environmental violations by the application of Blue Engineering through its tool the TINS-D Constellation. Monsanto's recent environmental lawsuit was considered, which was ruled for a 700 million USD settlement penalty for the pollution of the Oregon's waterways due to the discharge of polychlorinated biphenyls. With the current environmental laws structured to levy monetary penalties on the violator, this lawsuit was subjected to a group of Blue Engineering students, to see if a different ruling could be achieved. On successfully conducting the research, it was seen that a new ruling which attained which resulted in a cleanup by Monsanto under the supervision of a third party which had unanimously received a 75% acceptance. With this being in accordance with the hypothesis the research question was answered. It could be concluded that the application of Blue Engineering and its tool reduced the reliance of Environmental Laws on monetary penalties thereby increasing the potential of establishing environmental laws to solving the environmental problems democratically.

Contents

Sl.No	Chapter Name	Page No
1	Introduction	1
2	Methodology	3
2.1.	Preparation Before the session	3
2.2.	Schedule of the session	4
2.3.	Lawsuit Considered	4
2.4.	Preparation During the Session	4
2.5.	The Tool: TINS-D Constellation	4
2.6.	Participants Preparation Phase	5
2.7.	Plenary Discussion	5
3.	Results	5
3.1.	Preparation Statement	5
3.2.	Plenary Discussion	6
3.3.	Reasons Stated for Final Ruling	6
4	Discussion	7
5	Conclusion	9
6	Reference	10
	Appendix (Building Block)	12

Acknowledgements

I would like to express my sincere gratitude to our supervisor, whose initial support to allow me to start this research while doing my courses in parallel allowed me to conduct this research. I would also like to extend my heartfelt gratitude to the Blue Engineering Team, in supporting me to carry out this research which was extremely important for conducting this research.

1. Introduction:

Jerry and Amy (2023), in their study of discretion and disparity in environmental penalties, states, compliance through deterrence, is the major criteria for the implementation of environmental laws. The enforcement of which, is carried out by the government, in order to make sure the violations that occurs, does not allow the violator to be in an economic advantage over the non-violators. It can be understood that the implementation of the environmental laws, is defined more to curb the economic advantages and disadvantages of the violators and the non-violators rather than solving the environmental problem. This system of valuating the economic advantages the violator has over the non-violator was seen to be not successful based on the data obtained in the study conducted by Jerry and Amy, (2023).

Among the various pollutions that occur, water pollution is considered in this study. From a survey conducted by researchers, (United Nations Environment Programme 2023), it showed that from the 75,000 bodies of water in 89 countries, 40% was seen to be severely polluted. The geographical region considered for the study is United States of America, for which the laws applicable is the Clean Water Act (CWA), 1972. Through this Act, the Environmental Protection Agency of the United States implements pollution control programs, varying from setting the wastewater discharge standards, to protecting the watersheds and the sources of drinking water in the United States against the violators, (United States Environmental Protection Agency 2023). The compliance monitoring, and the enforcement measures to prevent the water pollution is carried out in cooperation with the local federal and state regulatory partners.

The National Pollutant Discharge Elimination System (NPDES) program serves as the compliance monitoring system through which the discharge pollutants into waters of the United States is regulated. Clean Water Act, (1972), National Pollution Discharge Elimination System Compliance Monitoring Strategy, 2014, sets the goals, provides the set

of tools for determining the compliance and to address the local water pollution and compliance concerns for the Environmental Protection Agency to execute these actions. The regulations set out in this subsection of the Clean Water Act, (1972), address the frequency and the type of compliance monitoring activities. This is in accordance with various categories of the NPDES regulated facilities with the goal being to ensure and document, the entities that are regulated by the NPDES, comply with their respective CWA obligations.

In order to verify the compliance and take actions accordingly, the Enforcement Management System of the NPDES, 1986, is laid out. It constitutes a framework for the enforcement actions starting from the review of the violation to the guidance on bringing these enforcement actions against the violators. Civil Administrative, Civil Judicial, and criminal actions are the different types of enforcement actions that are carried out by the enforcement authority. Subjecting the civil enforcement actions, results in the possibility of either of the following four results; settlements, civil penalties, and injunctive relief and supplemental environmental projects (SEPs). Whereas criminal enforcement results in criminal penalties or in the worst-case scenario, incarceration.

Apart from incarceration, all the other enforcement actions result towards monetary measures to mitigate the environmental pollution, then solving the pollution itself. It further strengthens the questioning of the environmental laws, as to whether it serves the purpose of solving the pollution problem and whether the concerned bodies causing the pollution are made accountable for solving the environmental pollution and those affected by the pollution are given justice.

With the violators being penalised monetarily, the focus of the study then shifts on those affected by the pollution; the various stakeholders such as, the individuals, nature itself, the society, and the environment at large. Environmental democracy as stated in Centre for International Environmental Law, 2015, is based on decision making related to land and

natural resources which adequately and equitably address citizens' interests. With the environmental laws currently designed to penalise the violators and democracy being as stated above, truly in which approach the environmental problems can be solved, the dilemma arises. The dilemma over what would be the right way forward in finding a solution to the environmental problem; the existing environmental laws or a restructure of the environmental laws on a democratic basis.

The European Commission, The Aarhus Convention, and the EU, (July 2021), describes environmental democracy as protecting every person's right to live in a healthy environment by guaranteeing three rights to the public; Access to information, public participation, and Access to Justice.

To find a solution to this dilemma, the responsibility of solving the problem needs to be considered by all the stakeholders affecting the environment, i.e, the technology which causes the pollution or solves the pollution. The nature and the society that is affected by the pollution. The individual, which would implicate the individual body (company) or an individual responsible for creating the problem, or being a decision-maker towards solving the environmental problem. To analyse from this perspective, Blue Engineering is applied. The developer of Blue Engineering, in his work, Baier, A. (2013)., states that, Blue Engineering is a tool which offers a view beyond one's own horizon while providing a framework to reflect on the problem, from one's own responsibility and from the responsibility of the other, which in this case, is the responsibility of the environment, which is to provide a liveable habitat to its occupants.

To dismantle this dilemma, the tools available in the Blue Engineering toolbox are used in this study. These tools serve as means to uncover what seems to be hidden and connect the concepts, which again, seem to be separated as mentioned in *RAD AB SCHRAUBE LOCKER*. (n.d.). The TINS-D constellation, (Technology, Individuals, Nature, Society and Democracy), one of the many tools present in the Blue Engineering toolbox is used in this study which

helps in creating new things and letting old things pass away. In the TINS-D constellation, Democracy is placed in the middle, to allow for a democratic approach in the decision-making processes and decisions regarding the entire interrelationship. Being based on the Critical Theory of the early Frankfurt School, Baier, A. (2019), there is not yet a theoretical description of the TINS-D Constellation. The only implementation of which is in the Blue Engineering Course as an educational method which has been successful.

With this approach and the use of this tool, it makes it possible to analyse both, the individual co-ordinates of the TINS-D and their interrelationship.

In one of the studies conducted in, (*RAD AB SCHRAUBE LOCKER*. (n.d.)), on *Landwirtschaft*, it is seen that social and technical progress can be measured by the proportion of people who are primarily involved in food production, showing that industrialized agriculture does produce efficiently. But when the TINS-D tool is applied in the study, and industrialized agriculture is viewed through this lens, the question that arises is not whether people farm, but how and for what purpose. As industrialized agriculture leads to higher yields, analysis through the lens of TINS-D constellation shows that despite all the mechanization and industrialization, there is still excessive use of natural resources and that there is no global social justice in relation to food. With this study of TINS-D conducted, the perspective is shifted from industrialization to excessive use of natural resources with no real global social justice in relation to food as was concluded in the study, *Landwirtschaft*, (*RAD AB SCHRAUBE LOCKER*. (n.d.)).

This application of Blue Engineering is tested in this study, by applying it to environmental lawsuits through a group of Blue Engineering students. Blue Engineering students, in this study are those who have gained initial experience of using the building block framework in phase one of the course, and reflecting upon topics like *Landwirtschaft*, in arriving at democratic decisions using the Blue

Engineering tool, TINS-D. This reflection, in the form of a statement from the Blue Engineering group of students is then compared with the author's perspective, also a Blue Engineering student, having gained additional experience by developing a building block, scheduled in phase three of the course of Blue Engineering, which the group of students in the study will undertake in the subsequent sections of the course. Arising from this objective, the research question is stated:

RQ: Will the application of Blue Engineering and its tool, reduce the reliance of Environmental Law on monetary penalties and increase the potential of establishing Environmental Laws in solving the environmental problems democratically.

From the current approach of the Environmental laws which focusses on monetary measures in mitigating the problem, and the democratic approach, which focuses on, establishing environmental laws that solve the environmental pollution, the hypothesis was formulated:

H: "On application of Blue Engineering, the measures to mitigate environmental pollution would be to implement problem solving measures and not through monetary measures."

The hypothesis, if true, would then result in a democratic approach, by establishing environmental laws that solve the environmental problem, being the way forward.

2. Methodology

Blue Engineering has a set of central concepts, called tools which are present in the Blue Engineering toolbox. This toolbox was used to provide this understanding of ecological and social responsibility. The tool considered in this study is the TINS-D constellation which was

facilitated through a teaching unit called a building block with a specified teaching method catering to this individual problem. The standard template of the building block is present in the appendix.

In this study it is to be understood that the facilitators are the people that present the problem, by creating the building block pertaining to the problem, to the participants, which in this study are the group members participating in the discussions. The facilitators however only present the teaching unit, which was the building block and do not take part in the group discussion.

The teaching unit was facilitated through to the participants in person with emphasis on decision making, and in this study, the participants in the groups arrived at a ruling on the lawsuits. The information which was needed for the participants to take the decisions was also given importance. The goal of the teaching unit was then to ensure justice is provided to the environment by building a community, carrying the mindset of a common outcome and with a common goal.

This study was carried out by adopting a creative and cooperative mode of learning with open ended discussions. These discussions were carried out for a time of 40 minutes amongst 4 groups of participants and 1 group of facilitators comprising a total of 22 members. 2 groups consisting of 4 students and 2 groups consisting of 5 students with the facilitators' groups consisting of 4 people. As these were open ended discussions, a time limit of 40 minutes was considered, without which, the discussions would be carried on for a longer time and a result would not be yielded. With no further materials needed, the teaching unit was facilitated with an initial preparation by the facilitators and the participants which is mentioned in detail in further sections. With the schedule also being an important aspect, as to maintain the stipulated time of 40 minutes, the content of the different sub parts of the teaching units are indicated in detail below.

2.1. Preparation: Before the Session

For the preparation of the facilitators, Aarhus Convention 20th Anniversary, 2018, was referred and mentioned in the building block for

the facilitators and the participants to read through for understanding what the environmental democracy stands for.

In this study, Access to justice, which describes the enforcement of environmental law or compensation for damages is not considered, as the author sees this to be ambiguous. The facilitators take this ambiguity into consideration while preparing for the facilitation of the building block with the case studies referred being lawsuits involving environmental violations, but not considering the rulings as that is what is being challenged in this study and helping in understanding the dilemma better.

To conduct this experiment, the facilitators prepare the particulars of an existing environmental lawsuit in a document, by providing; 1) the violator- the individual or a company that commits the violation and their occupation, 2) area of violation- geographical location and the surrounding constituents such as habitat, communities living, etc, 3) the type of violation- if it is polluting the air, water, soil, etc.

For the preparation of the participants, this document, the building block, is provided to them, before they attend the session where this study is carried out. The participants are requested to read through this building block and analyse from their individual perspective, on how they would take the decisions to solve the problem they are presented with.

2.2. Schedule of the Session

For the introduction of the session, the facilitators introduced the building block by summarizing, aspects of environmental democracy, the lawsuit, and different aspects of the lawsuit. The schedule is indicated in Table 2.2.

Table 2.2. Session Schedule

Time [min]	Event
00:00	Introduction
00:05	Participant's Preparation
00:20	Plenary Discussion
00:45	Conclusion

2.3. Lawsuit Considered

For this study, the lawsuit considered is *Oregon Department of Justice vs Monsanto*, Profita, C. W. |. C. (2022, December 16).

Monsanto is an American agro-chemical and agricultural biotechnology corporation founded in 1901 and headquartered in Missouri. Monsanto, is the sole producer of polychlorinated biphenyls in the United States from 1930 to 1977. As ingestion of PCB which can occur either inhaling, dermal contact, or through fatty foods, studies have shown that chronic oral exposure is associated with both cancer and non- cancer health effects, Markowitz, G., & Rosner, D. (2018).

The production of PCB has resulted in the water pollution in Oregon's waterways and because of this, Oregon Department of Justice had filed for a lawsuit against Monsanto. The result of the lawsuit ended in a settlement reaching nearly 700 million USD.

Note: This detail of the settlement value is not mentioned to participants, in order to mitigate this thought process of ruling.

2.4. Preparation: During the Session

For the preparation during the session, the facilitators followed the schedule as mentioned and the content of the session is carried out as indicated in the appendix.

For the preparation of the participants which occurs from minute 5 to minute 20, the group members discuss amongst themselves and decide the nature of the ruling through the lens of TINS-D Constellation by putting themselves in the shoes of the community and the environment which is affected by the violation committed. A collective decision was then noted down and the reason for arriving at the respective decision is stated along with the respective group numbers which was then used for the plenary discussion.

2.5. The Tool: TINS-D Constellation

This study aims to expand the TINS-D Constellation to a real-life problem, in this case being environmental lawsuits, and gather the results of the ruling and how they would vary by the application of this educational method through the Blue Engineering course. With the TINS-D Constellation allowing for analysis of the individual co-ordinates (Technology, Individual, Nature, Society, Democracy) and

their inter-relationships, this analysis is carried out during the participant's preparation phase of the session.

The TINS-D Constellation, from the work of Baier, A. (2019)., conceptualizes the reciprocal relations of technology, individuals, nature, society, and democracy (TINS-D) by placing them on opposite poles of two intersecting axes. At the intersection of these axes' rests democracy calling for a democratization of the other four concepts. Whereas technology and nature, and, individual and society, are placed on the opposite poles of the intersecting axes, with all the five concepts being set to construct each other as they are reciprocally related.

2.6. Participant's Preparation Phase

During this phase, which lasts for 15 minutes, the facilitators request the participants to breakout into groups of 4 and 5 members. The participants then discuss the lawsuit within the group members, to attain a suitable ruling by placing themselves in the position with the environmental mishap having occurred around them. The participants are encouraged to put themselves in the shoes of the community and the environment being affected and then arrive at a ruling which could improve the situation. The participants then note down their collective decision and present them in the common excel sheet which is provided to all the groups which is again used in the plenary discussion.

2.7. Plenary Discussion

For the plenary discussion, all the groups then weigh the rulings on a scale of 1 – 5 and then based on the highest weight, the final ruling is chosen. For the final ruling, the groups then individually agree or disagree and state the reason for them concluding as to why they agree or disagree.

3. Results

The results are divided into three sections, and presented in order of the session held

3.1. Preparation Statement

During this session, the statement concluded by the groups after the analysis with TINS-D is presented. Table 3.1. presents these statements.

Table 3.1. Preparation Statement

Group Numbers	Statements
Group 1	If PCBs are detected in Oregon's waterways, above levels deemed to be safe or acceptable by an independent agency, Monsanto is not allowed to operate in Oregon.
Group 2	As the company already knew they were doing harm to the environment, they now can be held responsible. Thus, they should perform the clean up under supervision of an independent party
Group 3	If this disincentive other companies to do the same, the penalty is enough.
Group 4	The company should admit to wrongdoing as an acknowledgement to the people and environment they've damaged.

From the statements obtained, it is seen that different rulings are stated from different groups. The statement provided by Group 1, is seen to focus on the operational aspects of Monsanto deeming them to not be given permission to conduct any more activities in the respected area. Group 2 however, states importance on the cleanup of the area and to ensure it is carried out in full, Group 2 also suggests supervision by an independent third party. Group 3 however focusses only on the monetary aspect even though it is stated in the methodology that such statements would not be considered. Group 4 however focuses on the acceptance of the mistake and nothing further is stated.

On analysing the statements from the four groups, it could be seen that, all the groups were able to tap into the aspects of the TINS-D Constellation. With the Technology element, being the technology used by Monsanto to produce polychlorinated biphenyl. The Individual element being Monsanto itself, and the pollution, caused by the technology implemented by Monsanto, affecting the Nature which in-turn impacted the Society, the only element that remained is Democracy. To democratize, was to solve the problem by considering all the stakeholders. For which one statement/ruling was needed. This was attained in the plenary discussion phase.

3.2. Plenary Discussion

The statements presented by all the groups are then weighed out of 5 to determine the final ruling of this study. The weights for the statements presented by the respective groups are indicated in Table 3.2. The maximum weight that could be given however was 5 in this study.

Table 3.2 Weights in Plenary Discussion

Group Number	Group 1	Group 2	Group 3	Group 4
Group 1	4	2	1	1
Group 2	3	3	4	3
Group 3	2	1	3	4
Group 4	1	4	2	2

Table 3.2.1 represents the total weights received for each of the groups.

Table 3.2.1. Total Weights

Group Number	Total Weights
Group 1	8
Group 2	13
Group 3	10
Group 4	9

From the weights seen in Table 3.3, group 2 received the highest weight from which it can be concluded that the final ruling obtained in this study is the clean-up of the environmental mishap under the supervision of an independent third party.

3.3. Reasons Stated for the Final Ruling

Once the final ruling was determined based on the weightage given by the groups, the reasons for the groups' agreement or disagreement for the same is determined. This is presented in Table 3.3.

Table 3.3. Final Ruling Agreement/Disagreement

Group Number	Agreement/Disagreement: Reasons
Group 1	Partially Agree: - At the same time, we feel like the industry should also be moved
Group 2	Agree: -Because they were aware of the consequences
Group 3	Agree: - It talks about the moral responsibility and action
Group 4	Agree but voice caution: - We agree with this statement, however, we recognize there are potential pitfalls. The reliability of an independent party is unknown therefore it depends on the independent party

From the above table, group1 partially agrees with the ruling as they also state that the industry should be relocated. Group 2's statement being weighed the highest, the reason for their ruling is due to Monsanto already being aware of the consequences, Group 2 implies it is their responsibility to clean it up. Group 3 agreeing with the ruling, states that it is Monsanto's moral responsibility to take action to solve the problem. Group 4 also agrees while voicing caution against the independent party. They state there are potential pitfalls in the ruling as it relies on the independent party for the effective implementation of the clean-up.

From the statements of all the groups, group 2 stated for the clean-up, and when the other groups were made aware that clean-up was required, 3 of the 4 groups ruled in their favour

which resulted in a 75% acceptance, leading to a Democratization of all the aspects of TINS-D.

To understand how this resulted in democratization, all the aspects are reversed from how they were concluded in the preparation statement.

As the ruling stated clean-up, it can be concluded that Technology needs to be implemented by the Individual, Monsanto, to clean the pollution problem, thereby remedying the Nature, and reducing the impact already affecting the Society.

As this decision would result in the possible reversible of the impact, while taking all the stakeholders into consideration, it can be said that, the statement does democratize all the aspects of TINS-D.

4. Discussion

From this study the ruling that is obtained by the application of the Blue Engineering tool, the TINS-D constellation on an environmental lawsuit is seen.

Firstly, to enforce an action against environmental violators, the current environmental laws require the EPA to substantially penalise monetarily with an aim to improve the public health and improve the environmental compliance by deterring any further violations that may occur. With the use of penalties, the EPA views this as a measure which will help spread uniformity by ensuring the violators does not obtain an unfair economic advantage over the competitors who have not committed any violations, and comply with the environmental regulations. The EPA also sees, penalties as an approach to encourage the companies to implement pollution prevention and recycling strategies as to minimise their pollutant discharge and reduce the potential liabilities. On further analysis of the Interim CWA Settlement Penalty Policy, (2023, August 23), it is seen that the policy is framed with four important environmental goals. Imposed penalty should be large enough as to deter non-compliance. Penalties do not allow the violators to obtain an economic advantage over their competitors with the penalties being majorly

focused to recover the economic benefit generated due to the non-compliance. An additional gravity amount is also levied, proportional to the gravity of the violation. Consistency of these penalties is also given importance which is the third important goal of the Interim CWA Settlement Penalty Policy, (2023, August 23). The fourth is to levy settlement penalties based on a methodology carrying logical means with an aim to ensure the enforcement actions are quick in resolving the violations at hand. When the implementation of these regulations is analysed, it was concluded in the study conducted by Jerry and Amy (2023), that there was clear disparity in authorizing these penalties. On further analyses, by Jerry and Amy, it was seen that fundamental problems exist in the calculation of the penalties which undermine the goal of the uniformity which the Interim CWA Settlement Penalty Policy, (2023, August 23), proposes to implement. Again, from the study conducted by Jerry and Amy, it is seen that the factors considered for imposing these penalties are vague and do not consider the weight distribution to these factors. These factors as mentioned in the Clear Water Act, consider seriousness of violation before imposing the penalty. The economic benefit resulting from such violations and history of such violations also play a crucial role while imposing the penalty. Good-faith efforts to comply with the applicable requirements of the regulations also play a role in reducing the quantum of penalty. If the economic impact of the penalty on the violator is higher, again the quantum of penalty is reduced and such other matters as justice may require. From these factors mentioned how much weight is given to each of these factors and how in certain cases all these factors are to be considered or not to be considered are vague, thereby indicating the fundamental problems that exist in the penalty calculation. With this, the damages to the environment are being translated to a financial value. With fundamental problems already existing in the calculations of the settlements and penalties, the approach in solving the environmental pollution problem is under question.

Along with the penalties, another method of litigation that is available is the issuance of supplemental environmental projects (SEPs). From the Interim CWA Settlement Penalty Policy, (2023, August 23), supplemental environmental projects are defined as environmentally beneficial projects which a violator undertakes. This is generally taken by the violator in exchange for a favourable penalty. But what is interesting to note is that, although they are defined as environmentally beneficial, it also states in bold that SEPs are not legally required to perform as a component in the settlement agreement and an agreement to perform the project is left to the violator's discretion.

Though supplemental environmental projects maybe better compared to settlements and penalties, it only acts as a measure to mitigate the penalty and not to mitigate or solve the problem. Even in the considerations of the supplemental environmental projects, with community involvement being a factor, it only states in appropriate cases. The question that then arises is when is it deemed to be appropriate to involve the community to take a decision on the environment in which the community lives.

With the above-mentioned enforcement actions and laws to mitigate the violation, when the Monsanto lawsuit is considered, a 700 million USD settlement has been approved as a measure to rule the case.

To challenge this, when the lawsuit is democratized, or the violation is democratized through the lens of TINS-D constellation, by a group of Blue Engineering learned students, it can be seen from the results that the ruling statement is to perform a clean-up of the pollution caused under the supervision of an independent third party. When the reasons for the final ruling are analysed, it can be understood that, the reasons are quite different for them to agree or disagree with the ruling. With group 1 partially agreeing by giving a weight of 3 out of 5, and expressing concern to move the industry to a different location, group 3 gives the highest weight of 4 agreeing completely with the ruling stating it is the moral

responsibility of Monsanto to take action to clean up. Group 4 also agrees with a weight of 3 but voices a strong caution as the clean up under the supervision of a third party has potential pitfalls as it is dependent on the reliability of the third party which can be uncertain. Group 2's ruling is the final ruling stating clean up, based on the weight achieved, it is stated by the group itself that as Monsanto was aware of the consequences, Monsanto needs to clean it up, which obtained a 75% acceptance with 3 out of the 4 groups agreeing to the final statement.

With other statements also being made, it can be understood that, the other groups were inclined more towards the economic benefit that might arise with respect to other companies and public admission of guilt, as their respective statements. These statements do not indicate rectifying the problem but only indicates to penalising the violator. When all the groups are made of aware of, that clean-up is what is required to solve the pollution problem, it is unanimously decided to rule in favour of this statement. To introspect as to why these statements would be made, would be due to the respective understanding of the group members to this relatively new process of approaching a decision. As the building block is designed in a way, where it needs to be self-understood, it is highly dependent on the seriousness of the readers at the time of reading.

The advantage of using such a process, in this case, Blue Engineering, is that it eliminates to a certain degree the influence that might exist at the time of presenting. It can be argued that there always exists, some percentage of bias, in everything that is carried out in everyday life, and the only way to remove the bias, is to first identify it. In order to remove the bias, it becomes extremely important, to ensure the motive behind removing the bias. In this study, the motive was to ensure the environmental problem was solved and all the stakeholders are taken into consideration. Hence the said Blue Engineering tool was used in this building block. In this case, for the environmental justice the bias was monetary penalty as the problem is solved by translating it to a financial value. With this building block, this translation was

eliminated, by not giving the participants the choice of monetary penalty.

However, as some groups still decided monetary penalty as a ruling, it can be said that not everyone were still familiar with the process and how the tool was supposed to be used to arrive at the results. It can also be said that, how the building block is presented to the participants, also plays a crucial role, in solving the problem. The reason being, the information that is contained in the building block, which is used and the tool, the lens, through which this information is viewed, and a decision is made, are all crucial factors for Blue Engineering to be applicable. With the stipulated time limit of 45 minutes to conduct a Blue Engineering session, the building block serves as a method of teaching/ communicating the problem to the participants.

In this building block, as the result that was achieved, was in accordance with the hypothesis, and with three out of the four groups agreeing to the statements resulting in a 75% acceptance this building block can be considered reusable for similar problems.

However, anything can always be improved and expanded and so is the Blue Engineering building block which can be tailored even better to suit problems, and even better, if the problems are open ended. With the Blue Engineering tool being another element, it is important to choose the right tool for the right problem, as not all tools cater to all the problems. With the above-mentioned elements combined and with the change in ruling from penalising to solving the problem by clean up, this legal dilemma of reducing the reliance of environmental laws on monetary penalties and increasing the potential of establishing environmental laws in solving the environmental problems democratically, Blue Engineering through the lens of TINS-D creates this change in decision making thereby answering the research question in accordance with the hypothesis.

5. Conclusion

From this study it can be concluded that on application of Blue Engineering, the reliance of

environmental laws on monetary penalties to solve the environmental problems would be reduced and the potential of establishing environmental laws to solve the environmental problems democratically would increase.

Out of the 4 groups that were a part of this study, to litigate the Monsanto lawsuit, which was under a 700 million USD settlement penalty, 3 out of the 4 groups, agreed to the final ruling stating that as Monsanto was aware of the consequences, it is their moral responsibility to act and perform the clean-up activity under the supervision of a third party.

With 75% acceptance, as 3 out of the 4 groups agreed to this decision, it can be concluded that, Blue Engineering, through the lens of TINS-D, creates a change in decision making, thereby answering the research question in accordance with the hypothesis, which was to mitigate environmental pollution through problem solving measures and not through monetary measures resulting in a democratic approach.

6. References

Clean Water Act National Pollutant Discharge Elimination System Compliance Monitoring Strategy | US EPA. (2022, September 14). US EPA. <https://www.epa.gov/compliance/clean-water-act-national-pollutant-discharge-elimination-system-compliance-monitoring>

Aarhus. (2021, July 13). Environment. https://environment.ec.europa.eu/law-and-governance/aarhus_en

Profita, C. W. |. C. (2022, December 16). Oregon reaches nearly \$700M settlement with Monsanto over PCB contamination. *Opb*. <https://www.opb.org/article/2022/12/15/oregon-settlement-monsanto-pcb-contamination-attorney-general-ellen-rosenblum/>

Markowitz, G., & Rosner, D. (2018). Monsanto, PCBs, and the creation of a “world-wide ecological problem.” *Journal of Public Health Policy*, 39(4), 463–540. <https://doi.org/10.1057/s41271-018-0146-8>

Werkzeuge | RAD AB SCHRAUBE LOCKER. (n.d.).

<https://rad-ab.org/werkzeuge>

Landwirtschaft | RAD AB SCHRAUBE LOCKER. (n.d.). <https://rad-ab.org/anwendungsfelder/landwirtschaft>

Jerry L. Anderson & Amy Grace Vaughan, *Environmental Penalties: Discretion and Disparity*, 42 *Stan. Env'tl. L. J.* 3 (2023).

<https://law.stanford.edu/publications/environmental-penalties-discretion-and-disparity/>

Interim Clean Water Act Settlement Penalty Policy | US EPA. (2023, August 23). US EPA. <https://www.epa.gov/enforcement/interim-clean-water-act-settlement-penalty-policy>

2015 Update to the 1998 U.S. EPA Supplemental Environmental Projects Policy | US EPA. (2022, September 19). US EPA. <https://www.epa.gov/enforcement/2015-update-1998-us-epa-supplemental-environmental-projects-policy>

United Nations Environment Programme. (n.d.). Globally, 3 billion people at health risk due to scarce data on water quality. *UNEP*. <https://www.unep.org/news-and-stories/story/globally-3-billion-people-health-risk-due-scarce-data-water-quality>

The enforcement management system: National Pollutant Discharge Elimination System (Clean Water Act) | US EPA. (2022, November 16). US EPA.
<https://www.epa.gov/enforcement/enforcement-management-system-national-pollutant-discharge-elimination-system-clean>

Center for International Environmental Law. (2018, December 17). *Environmental Democracy & Access Rights - Center for International Environmental Law.*
<https://www.ciel.org/issue/environmental-democracy-access-rights/>

Baier, A. (2019). *Education for sustainable development within the engineering sciences - design of learning outcomes and a subsequent course evaluation.* <https://doi.org/10.14279/depositonce-8844>

Baier, A. (2013). Student-Driven courses on the social and ecological responsibilities of engineers. *Science and Engineering Ethics*, 19(4), 1469–1472. <https://doi.org/10.1007/s11948-013-9490-z>

Appendix (Building Block)

The Legal Dilemma for Environmental Democracy

Title

The Legal Dilemma for Environmental Democracy

Abstract

The decisions that are taken on land and natural resources, basically everything that involves the environment, adequately and equitably address citizen's interests. Environmental democracy promotes this same idea. It provides a basis for how decisions should be made and this building block presents this concept and aims so that participants will take a critical point of view.

Participants understand the concept of environmental democracy by being together as one community and taking a decision together towards the specificity of the case. From the three main points of the Aarhus convention, indicating the general concept of environmental democracy, only two are considered here: 1) ability for people to freely access information on environmental matters, 2) meaningfully participation in decision making. 3) right to seek justice, such as compensation or appealing a project when there is lack of access to information and participation. This point of the democracy from the Aarhus convention will not be considered in the cases here, as it arises for ambiguity between the law as the law considers monetary penalty as the main solution to solve an environmental lawsuit and the third point of democracy indicates compensation as a method of right to justice.

The participants work together collectively in the preparation part. The participants are allowed to reflect among themselves and come to a decision as to what the community and the environment would need in case an environmental mishap occurred. All the group members, collectively contribute equally a statement each, for what needs to be done in order to mitigate the impact and how the contributor to the impact will be handled. For the demonstration of the same, an environmental lawsuit will be considered for which the ruling has already been given and through this building block, the ruling will then be analysed.

Topic

The dilemma of environmental democracy: Will the application of Blue Engineering and its tool, sway the existing ruling of an environmental lawsuit.

Lesson Type

Physical/in-person

Keywords

Lawsuit, decision making, ruling, self-realization, access to information, justice, community building, prioritizing common outcome and common goal

Competences

Perspective taking, Cooperation, coping with dilemmas of decision- making, participation, motivation, acting morally, supporting others

Tools

TINS-D

Modes of Learning

Creative, Cooperative

Methods

Open ended, group discussion

Group Size

Equal number of 4 member and 5 member groups

Time

40 minutes (+15 min. preparation + 25 min. follow up)

Materials

No additional material needed

Quality

Building block of participants

Preparation and Follow Up

Facilitators' Preparation

In this part, the facilitators understand what environmental democracy means, by reading through the Aarhus convention which states the different points. It should be noted that, the third point of the Aarhus convention is not considered in this building block which describes about enforcement of the environmental laws or compensation for damages as this is seen to be ambiguous for the study. While conducting the building block, it will be a learning experience of decision making, of the defaulter and the judge. And also arriving at a common goal for the community and what the community and the environment needs, so that it is in a better position as to before. Case studies, in this case, will only involve lawsuits, involving environmental violations. But it is to be noted that, the ruling of the lawsuit should not be considered as that is what is going to be challenged through the tools of Blue Engineering.

To understand more about the dilemma of environmental democracy, environmental lawsuits are considered and to attain a different ruling than the ruling of the case is tried.

The analysis of the participants' preparation and feedback is carried out by the facilitators by gathering all the different rulings arrived by different groups and then summarizing the different rulings with their respective reasons for arriving at that particular ruling.

The facilitators prepare the particulars of an existing environmental lawsuit in a document by providing the following. 1) the violator- the individual or a company that commits the violation and what their occupation is. 2) area of violation- geographical location and the surrounding constituents such as habitat, communities living, etc. 3) the type of violation- if it is polluting the air, water, soil, etc.

Participants' Preparation

The participants receive the details of an environmental lawsuit from the facilitators. This includes, the violator, the area of the violation, and the type of violation. They read into the document and analyse from their own perspective and then attend the building block session.

Participants' Follow Up

For the follow up, they would reflect on the thought process of the group, for arriving at the decision they did and then in their respective learning journal, they would reflect on their individual and their peers thought process and analyse, why they came to that decision.

Schedule

Minute 00 – Introduction

Notes

The facilitators introduce the building block by summarizing, aspects of environmental democracy, the lawsuit and the different aspects of the lawsuit.

Slides

Schedule of Today's Session

- 00:00 – Introduction
- 00:05 – Small Group Work
- 00:20 – Plenary Discussion
- 00:45 – Conclusion, Follow-Up, and Feedback

Environmental Democracy

“Environmental Democracy sets a standard for how decisions should be made”

- *CIEL – Center for International Environmental Law (2015)*

Two main aspects considered of environmental democracy

- 1) Access to information
- 2) Public Participation

Description of the Lawsuit

Violator:

Monsanto, an American agrochemical and agricultural biotechnology corporation founded in 1901 and headquartered in Missouri.

Area of Violation:

Oregon's Waterways

Type of Violation:

Water Pollution

Monsanto, have been the sole producers of polychlorinated biphenyls in the United States from 1930 to 1977. Humans can be affected by the same when PCB is either ingested, inhaled or through dermal contact. The route to the general population would be through fatty foods (which would be fish, meat and dairy products). Studies have shown that chronic oral exposure is associated with both cancer and noncancer health effects.

Note: Monetary penalty is NOT an option for a ruling!

TINS-D Constellation

" Technology, individuals, nature, society, and democracy (TINS-D) repeatedly form powerful reciprocal relations that create something new and allow old ideals to fade away. These constellations must be both analyzed and democratized.

The constellation of technology, individuals, nature, society, and democracy (TINS-D Constellation) consists of five interconnected coordinates. Democracy is placed in the middle in order to determine the democratic content of any decision as well as the decision-making processes regarding TINS. At the same time, this allows for the clarification of a normative standpoint which aims to democratize the reciprocal relations of TINS. The TINS-D constellation allows for the analysis of both individual co-ordinates and their interrelationships.

Minute 05- Preparation for Participants

Notes:

The facilitators request the groups (equal number of groups of 4 and 5 members) to enter a breakout session. The participants are then allowed to discuss amongst themselves in their respective groups about the environmental lawsuit, and decide among themselves, what the ruling would be, if they were in the position and the environmental mishap occurred around them. They are encouraged to put themselves in the shoes of the community and the environment being affected and then come to ruling which would improve the situation. They note down what their collective decision is and the reasons considered for arriving at the respective decision and note them down on Brightspace with their respective group numbers. In addition to this, they would fill up the google spreadsheet which is then used for plenary discussion.

Link: [Dilemma of Environmental Democracy](#)

Minute 20- Plenary Discussion

Notes:

In the plenary discussion, the groups then weigh all the statements on a scale of 1-10 and then based on the highest weight, the final ruling is chosen. The groups then individually agree or disagree and state the reason why they have chosen to agree or disagree.

Follow up

In their respective learning journals, the individual students then reflect on the decisions taken by their respective groups and see if they individually agree or not.

Notes and Remarks

Facilitators can search for the most controversial environmental lawsuits and then take a blue engineering perspective by conducting the same in this building block.