The Relationship between Climate Change Attitude and Biodiversity Conservation Practices: The mediating role of Environmental Sustainability Awareness

ABSTRACT

Aims: To identify if there is significant relationship between Climate Change Attitude and Biodiversity Conservation Practices among the Senior High School students and to explore the mediating role of Environmental Sustainability Awareness on the relationship between Climate Change Attitude and Biodiversity Conservation Practices

Study design: Quantitative Non-experimental design

Place and Duration of Study: The study was conducted among the Senior High School students under the strand of Science, Technology, Engineering and Mathematics (STEM) within five private Schools of Davao City during the school year 2023-2024.

Methodology:A total of 306 students was chosen as respondents from five different private schools in Davao City, Philippines. The respondents were chosenusing stratified sampling. The following statistical tools utilized was done by mean, Pearson correlation coefficient and path analysis.

Results: Based on the statistical calculations,the results showed that students manifested a very high level of climate change attitude, biodiversity conservation practices, and environmental sustainability awareness. It also implied that there is significant relationship between students climate change attitude and biodiversity conservation practices. Statistical results also revealed that Environmental Sustainability awareness partially mediates the relationship of Climate Change Attitude and Biodiversity Conservation Practices.

Conclusion: The statistical results revealed that students climate change attitude was very high. Along with this, students biodiversity conservation practices was very high. Also, their environmental sustainability awareness revealed as very high. The results also revealed that there is significant relationship between Climate change attitude and Biodiversity Conservation Practices, Climate change attitude and Environmental Sustainability awareness, and Environmental sustainability awareness and Biodiversity conservation practices. Lastly, the results revealed that Environmental Sustainability awareness partially mediates the the relationship Climate change attitude and Biodiversity Conservation Practices

Keywords: Climate change attitude; Biodiversity Conservation Practices; Environmental Sustainability Awareness; Philippines

1. INTRODUCTION

Conservation of biodiversity is widely propagated in the world because it enhances the capacity of the environment to support the needs of humanity, and the balance of Biodiversity allows conventional function in the ecosystem. However, human activities and practices causes an imbalance to the nature of the ecosystem affecting its natural processes[1]. The investigation is about the impacts of biodiversity conservation emphasizes the significance of community engagement as a way of initiative both in conserving and preserving the environment[2]

Anthropogenic activities or environmental practices are one of the major factors that affect and reshape the dimension of the environment to carry its responsibility. This supports the study about the pressure of Human towards the environment, wherein there is a strong link between the human footprint in the ecological processes of the environment. In the area where the higher density of human footprint is found, there is a major depletion of animal movement in different species. The study of Bowlers provides a wider perspective of human density, human activities, and their relationship to the environmental pressure it laid on biodiversity. The different negative drivers or factors affecting the conservation of biodiversity should be magnified to address changes in biodiversity [3]

The overall effect of this problem is changing of climates, which is also one of the most concerning environmental problems that exist. The problem of climate change is associated with the attitude towards the environment. Due to its wide range of environmental concerns, it was divided the cause of this problem into two factors, first is bio-geographic, which confines the natural forces, and second is anthropogenic factors, linked with humanactivities[4]. It is more evident as to the present, that climate change is an unwelcome environmental problem based on the different reports over the past years. Human activities as an example, are changing the way that the atmosphere functions [5].

Barr mentioned that the International Panel on Climate Change (IPCC, 2022) proclaimed the worldwide increase of temperature of three degrees if global emissions continue to increase considering their current level. A threat to the earth's life is one of the important considerations resulting in catastrophic environmental consequences. With this, all sectors and universities have essential roles in preparing future generations to combat these environmental challenges [14].

Among all the factors that contribute to the causes of climate change, anthropogenic reasons mainly altered the processes of normal function of the environment. There is an alteration of the ecosystem that causes it to transform negatively due to climate change decreasing their capacity to support humanity which leads to the arising of some problems which is also because of some human activities that collectively affect the environment [15]. This is congruent to a study that awareness of climate change is indeed a need for the sustainability of the environment and human survival. Several human activities being identified in this study such as urbanization, deforestation, population growth, industrialization, and greenhouse gas production are labeled as main contributors to the quantity of carbon dioxide in the atmosphere [12].

This study is align to Sustainable Development Goal (SDG) number 13 focusing on climate action, that serves as a crucial backdrop to this research on environmental sustainability, climate change attitudes, and biodiversity conservation practices. This goal underscores the urgent need to mitigate climate change and ramifications, aligning closely with efforts to promote sustainable practices and preserve biodiversity. By exploring attitudes towards climate change and assessing

conservation practices, this study aims to contribute to SDG 13's objectives by identifying effective strategies that mitigate environmental degradation and foster resilience in ecosystems.

To support this study,Environmentally Responsible Behavior (ERB) theory recommended by Hines, Hungerford, and Tomera,will be utilized. The Environmentally Responsible Behavior provides the idea that an individual, organizations,or community advocating sustainability and promote appropriate environmental behaviour to minimize environmental degradation. It also involves people in different sectors such as environmental activists, policymakers, educators, and all citizen committed to sustainable practice [6].

The interactions of the mentioned variables are possible to develop Environmentally Responsible Behavior (ERB). This theoryexplain the reasons why and how a specific person adopt a certain behaviour towards environment and become responsible. According to the theory, the action of a person could be influenced by persons internal control center or one's own beliefs or decision-making process.The theory also highlights that how people think and feel has influences of how they behave, and this connection is also influence by some central control mechanism. The source claimed that the main control center explicitly influences an individual's attitudes, leading to a stronger intention to act and better behavior. Therefore, the theory emphasizes the interactions between various factors that affect an individual's behavior rather than the other factors of a single variable.

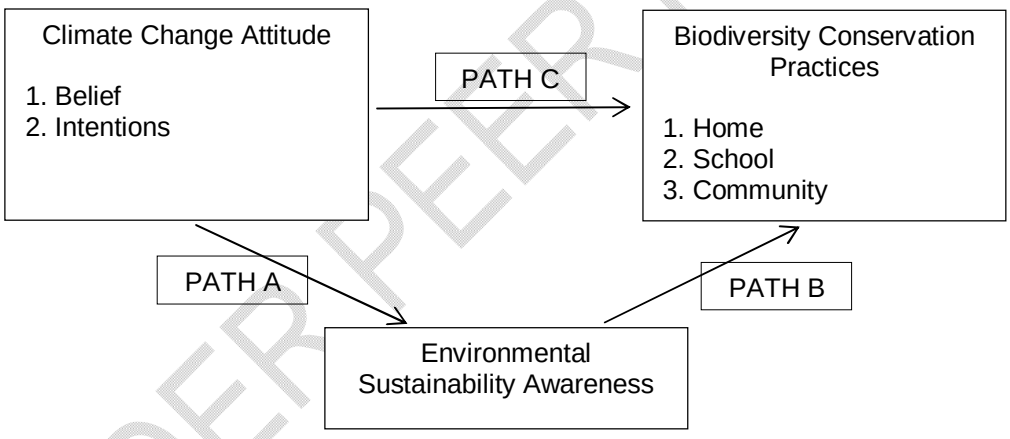

Figure 1. Conceptual Framework illustrating the three variables

The conceptual framework of this study provides an understanding of the relationship among the factors. In this study, the outcome measure is the Biodiversity Conservation practices of the students which focuses on the practices of conserving the environment at home, school, and community. Home is one of the indicators of the study and is considered as the primary gateway to raising a child that is environmentally concerned and responsible. Secondly, School is another institution that shows how they carry out their environmental action due to the consistent reminders of teachers about conservation. Lastly, the indicator Community helps to strengthen the molded environmental action from home and school. This variable is used to identify responsible citizens' awareness and environmental sensitivity and its anchored challenges and concerns.

There is a need to study students' Attitudes towards Climate change by Identifying their practices in Biodiversity conservation mediated by Environmental sustainability awareness since environmental problems exist due to human activities. It pursues to identify the relationship between the Biodiversity Conservation Practices of the students and Climate Change Attitudes and

how Environmental Sustainability Awareness mediates this relationship. This study seeks to understand what are the practices of the students in Conserving the Biodiversity and how they relate to their attitude toward climate change. However,no research exist that explores to understand this relationship using environmental sustainability awareness. The variables presented explored in different aspects and base on one concentration only. Through this research, students' biodiversity conservation practices will be identified as a means to predict the attitude towards climate change and mediated by their awareness of environmental sustainability.

2. MATERIAL AND METHODS

2.1 Respondents

A total of 306Grade 12 Senior High School students under the strand of Science, Technology, Engineering, and Mathematics was taken as a respondent to this study from the different private school based on the calculations of Raosoft Software and was randomly chosen using stratified random sampling with Slovin 0.005 level of significance. Other strand was not considered as part of this research since they were not knowledgeable nor totally exposed to major science subjects. Respondents of this study was informed with all the information needed and approved voluntarily to become part of this study.

2.2 Research Instrument

The researcher used a survey questionnaire with three parts for each variable. As recommended by graduate school research experts, this research instrument was revised and validated. The first part of the questionnaire adapted from the study of Ejem with a variable of Biodiversity Conservation Practices with a total number of 45 items . These items are divided to 15 per indicators – Home, School, and Community [7]. The second portion of the research instrument was adapted from Christensen with a total number of 15 items with the following indicators: Belief and Intentions as it also determines their climate change attitude [8]. The third portion part of the questionnaire that reflects the intervening variable of this research is adapted from the original instrument of Asio which contains a total of twelve items [9]. This variable does not need of indicators does it only mediate the relationship of the predictor and outcome variable. Before the questionnaire's distribution, the researcher made an initial reliability test to fifteen (15) participants using Cronbach Alpha to test its internal consistency. The Cronbach Alpha for the three variables is more than 0.70 implied that the three questionnaires was acceptable and ready to be administered.

2.3 Research Design and Methodology

This study employed a quantitative non-experimental, descriptive-correlational research design to identify the relationship between Students Biodiversity Conservation Practices which serves as the dependent Variable of the study and Climate Change Attitude as the independent Variable. Statistical technique employed to this study is descriptive correlational to measure and describe the relationship or association between two variables. This study also utilized the subsequent research statistical tools was used to compute and analyze the data collected: (1) Mean was used to characterized the Biodiversity Conservation Practices, Climate Change Attitude and Environmental Sustainability Awareness of the students. (2) Pearson correlation coefficient was used in this study to determine the significant relationship between Biodiversity Conservation Practices and Climate Change Attitude of students. (3) Medgraph using Sobel z-test was used to determine the mediating role of Environmental Sustainability Awareness in the relationship between Biodiversity Conservation Practices and Climate Change Attitude of students.

The researcher implements research ethical considerations and standards adherence to University of Mindanao Ethics committee. All means of communications has been made with approval to conduct the current study from the different private school officials with appropriate documentation.

These documents were secured with consent and authorization to gather samples needed in the completion of the study.

3. RESULTS AND DISCUSSION

3.1 Level of Attitude toward Climate Change of Students

Stipulated in the Table 1 the means statistical results of students level of attitude toward Climate Change. The table shows an overall computed mean of 4.64, indicating an exceptionally high statistical descriptor of Very High, with a variability of 0.21. This implies that the Attitude of students in Climate Change is always manifested and reflected in terms of their belief and intentions.

The same outcome was concluded by Magulod that there is a very high level of awareness of students attitude in Climate change. Students in this case execute a positive and high level of attitude in reducing the effects of Climate change despite being analyze by age, gender, residence, and birth order. It also reflects that students has a high level of awareness the importance of tree planting, growing more organic product, purchasing of local products, and proper using of energy. students shows a high level of conviction and endorsement of the mentioned expressed climate change attitude. Students climate change attitude firmly believe in the existence and severity of climate change and may be more likely to support proactive measures to address it [10].

Table 1. *Level of Attitude toward Climate Change of Students*

Indicator	SD	Mean	Descriptive Level
Belief	0.22	4.78	Very High
Intentions	0.37	4.49	Very High
Overall	**0.21**	**4.64**	**Very High**

3.2 Level of Biodiversity Conservation Practices of Students

As shown in the Table 2, the overall mean for the three indicators was 4.58 with a statistical descriptor of very high, a variability of 0.12. Indicator In the Community of student level of Biodiversity Conservation Practice has the highest mean of 4.64 with a statistical descriptor of very high and a variability of 0.19. The second highest mean was the indicator At School 4.58 mean and variability of 0.19. Last, the indicator with lowest mean was At Home with 4.53 and variability of 0.26, and all indicators has an overall statistical descriptor of very high.

The following specified means connects the knowledge contributed by Raschke that there should be a community engagement in order to address environmental problems by showing an engagement as a means of conserving and preserving the issues concerning the environment [2]. The statistical descriptor on the analysis of data interprets that students shows a strong affirmation of their action at home, school and community. They firmly demonstrate conservation in biodiversity that greatly contributes in helping the environment.

Table 2. *Level of Biodiversity Conservation Practices of Students*

Indicator	SD	Mean	Descriptive Level
Home	0.26	4.53	Very High

School	0.19	4.58	Very High
Community	0.19	4.64	Very High
Overall	**0.12**	**4.58**	**Very High**

3.3 Level of EnvironmentalSustainability Awareness of Students

As shown in the Table 3, the overall mean for this variable was 4.67 with a variability of 0.18 and statistical descriptor of very high. This implies that students environmental sustainability demonstrate a high level of awareness and endorsement of the views expressed. They firmly believe in the existence and severity of environmental concerns and may be more likely to support proactive measures to address it.

The results of the computed means shows that students were aware of the existing environmental problems and the necessity of actions in providing solution. The conservation measure with the greatest mean was "The collection of waste in separate bins is important for a sustainable environment''. This idea is aligned to the idea that countries by countries, students by students and people by people, there was a strong connection on becoming aware of this environmental issues [11].

Table 3. *Level of Environmental Sustainability Awareness of Students*

Mediating Variable	SD	Mean	Descriptive Level
Environmental Sustainability Awareness	0.18	4.67	Very High

3.4 Significance on the Relationship between Attitude toward Climate Change and Biodiversity Conservation Practices of Students

As displayed in the Table 4, the result of the significance of the relationship between Attitude toward Climate Change and Biodiversity Conservation Practices of Students with a p-value of 0.000 with an overall correlation coefficient of 0.663 implies that there is significant relationship between the students Climate Change attitude and Biodiversity Conservation practices.
The result converge to the idea that students were aware of climate change and it influences their belief about their socio-emotional wellbeing. They also revealed that some factors that lack of understanding of people about climate change results to inappropriate activities or practices that could cause biodiversity destruction. Other factors has also been identified on this study such as, education, politics, and economic considerations to be driving force of why people practices towards biodiversity were improper [12].

The same result yielded between the relationship of Green Supply Chain Management (GSCM) practices and environmental performance of manufacturing firm. This implies that GSCM effectively enhances the environmental performance of manufacturing firms beneficial for the sustainability of the environment. The proper adaptation of environmentally sustainable practices positively contributes in reducing the negative impacts of environmental degradation and

identifying external factors such as societal pressures influences how GSCM practices impact organizational performance [16].

Table 4. *Significance on the Relationship between Attitude toward Climate Change and Biodiversity Conservation Practices of Students*

Attitude toward Climate Change	Biodiversity Conservation Practices			
	Home	School	Community	**Overall**
Belief	.756**	.740**	-.041	**.706****
Intentions	-.053	-.132*	.730**	**.327****
Overall	**.356****	**.279****	**.618****	**.663****

3.5 Analyzing the mediation of the Three Variables

Table 5. *Analyzing the mediation of the Three Variables*

Pairs	Variables	Correlation Coefficient	*p*-value	Decision on Ho
IV and DV	Climate Change Attitude and Biodiversity Conservation Practices	.663	<0.000	Reject the null hypothesis
IV and MV	Climate Change Attitude and Environmental Sustainability Awareness	.343	<0.000	Reject the null hypothesis
MV and DV	Environmental Sustainability Awareness and Biodiversity Conservation Practices	.681	<0.000	Reject the null hypothesis

Utilizing path analysis, the results of IV (climate change attitude) to MV (environmental sustainability awareness); IV (climate change attitude) to DV (biodiversity conservation practices); MV (environmental sustainability awareness) to DV (biodiversity conservation practices) was significant. Therefore, the MV has partial mediation in the relationship between IV and DV.

Fig. 2 shows that for every increase in climate change attitude, there is corresponding 0.405 unit increase in Environmental sustainability awareness.Also, for every unit increase in environmental sustainability awareness, there is an increase in biodiversity conservation practices. Furthermore, in every increase in climate change attitude, there is a corresponding unit increase of 0.298 in biodiversity conservation practices.

The result implied that although environmental awareness could explain the green behaviour of the undergraduate students, it also shows that there were some external factors to be considered that could explain its effect. The same results yield from this study, environmental sustainability awareness partially mediates the relationship of climate change attitude and biodiversity conservation practices of students due to some other factors such as personal values, students perceived behavior control, or direct experiences towards environmental degradation that significantly influenced their biodiversity conservation practices.

Analyzing the mediation of the Three Variables

IV: Climate Change Attitude
DV: Biodiversity Conservation Practice
MV: Environmental Sustainability Awareness

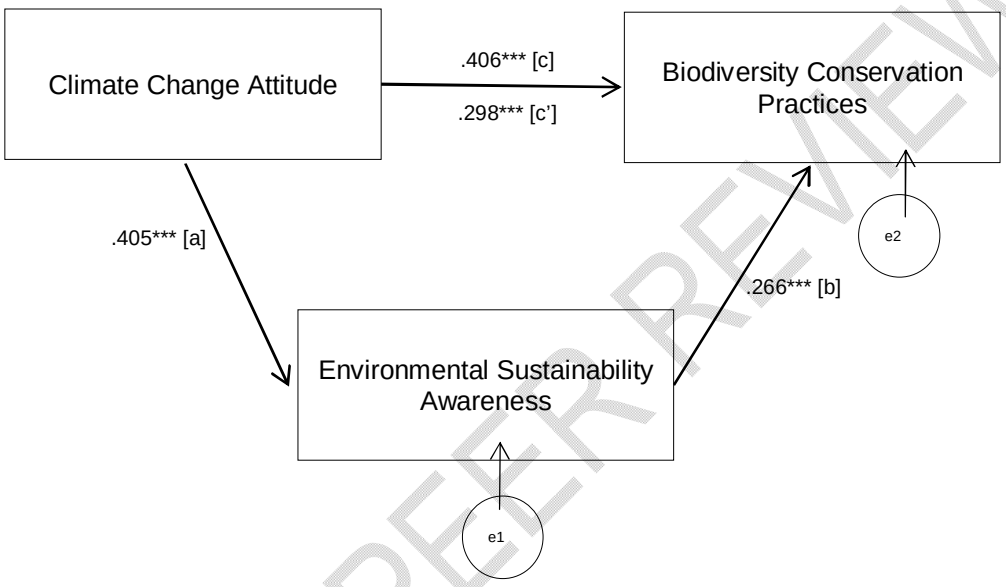

Figure 2. Mediation Model

Table 6. Mediation Analysis of the Three Variables

Step	Path	B	S.E.	β
1	c	.406	.026	.663***
2	a	.405	.064	.343***
3	b	.266	.018	.514***
4	**c'**	**.298**	**.021**	**.487****

4. CONCLUSION

In conclusion, the results shows that students level of Attitude towards Climate change is very high. Likewise, the level of students of Biodiversity Conservation practices of students obtained a statistical descriptor of "very high'. The level of Environmental Sustainability awareness also revealed a very high rating for this variable.This study also conclude that there is significant relationship among the variables which resulted to the rejection of the null hypothesis. Based on the statistical tool used, there is significant relationship between Climate change attitude and

Biodiversity conservation practices of students having r=0.663 and p <0.000. Climate change attitude and Environmental sustainability awareness has significant relationship having a result of r=0.343, p <0.000. Moreover, the results shows that Environmental Sustainability awareness has partial mediation to therelationship of climate change attitude and biodiversity conservation practices of students. Thus, Environmental Sustainability awareness mediates climate change attitude to increase the level of biodiversity conservation practices of students
This following concluded information was anchored to the theory of Environmentally Responsible Behavior that predicts the intention of responding a vital component that influences ERB. This indicates that peoples adaptation to action depends to their intentions, personal control over the scenario (locus of control) and knowledge. This theory also supports the outcome of the study indicating that knowledge alone is not enough to peoples initiative to help towards the environment. This implication provides an understanding that attitude of students has significant relationship to students biodiversity conservation practices [17].

RECOMMENDATION

The researcher suggests that students may developed and implemented environmental campaign that focuses on targeting public awareness towards climate change and awareness, especially among students. They may use different social media platforms, engage in community activities, and educational programs in disseminating accurate climate change impacts, mitigation, and the importance of accountability.

ETHICAL APPROVAL

The researcher complied all the necessary research criteria, protocol and standardized measures. It ensures that the research participants were voluntary and knowledgeable about the confidentiality and privacy of the study, following the stipulated guidelines of University of Mindanao Ethics and Review Committee with Protocol no. UMERC-2023-446.

Consent
As per international standards or university standards, respondents' written consent has been collected and preserved by the author(s).

Disclaimer (Artificial intelligence)
Option 1:
Author(s) hereby declare that NO generative AI technologies such as Large Language Models (ChatGPT, COPILOT, etc) and text-to-image generators have been used during writing or editing of manuscripts.
Option 2:
Author(s) hereby declare that generative AI technologies such as Large Language Models, etchave been used during writing or editing of manuscripts. This explanation will include the name, version, model, and source of the generative AI technology and as well as all input prompts provided to the generative AI technology
Details of the AI usage are given below:
1.
2.
3.

REFERENCES

1. Agduma, A.R., Garcia, F.G., etc (2023)., Overview of priorities, threats and challenges to biodiversity conservation in the southern Philippines., Regional Sustainability., DOI 10.1016 /Research Gate/ University of Southern Philippines.

2. Raschke A., Brown, M., Cheng, S. (2019). Evidence on Biodiversity Conservation Impacts. Center of Biology Outcomes, Julie Ann Wringley Global Institute for Sustainability,Arizona State University, Tempe, Arizona.

3. Bowler, D.E., Bjorkman, A.D., Dornelas, M. (2019). Mapping human pressures on biodiversity across the planet uncovers anthropogenic threat complexes. Published by John Wiley & Sons Ltd on behalf of British Ecological Society, Germany. DOI: 10.1002/pan3.10071.

4. Gazzaz, N.,Bassam, A. (2021)., Assessment of the Level of Knowledge of Climate Change of undergraduate Science and Agriculture Students, Jarash University, Jarash Jordan. http://wje.sciedupress.com

5. National Academy of Sciences, (2020)., Climate Change- Evidences and Causes., The Royal Society and the US National Academy of Sciences.

6. Akintunde, E. (2017)., Theories and Concepts for Human Behavior in Environmental Preservation., University of Jos, DOI: 10.26502/jesph.96120012

7. Ejem, L.Q., Bello, A.Q. (2013)., Environmental Awareness, Literacy and Biodiversity Conservation Practices of Freshmen Students in Bukidnon State University, Philippines., Print ISSN 224-1824 Online ISSN 2244-1816 http://dx.doi.org/10.7719/irj.v1i1.205

8. Christensen, R., Knezek, G. (2015).,The Climate Change Attitude Survey: Measuring Middle School Student Beliefs and Intentions to Enact Positive EnvironmentalChange.,The University of North Texas, International Journal of Environmental & Science Education. ISSN: 1306-3065

9. Asio, J. M. R. (2021). Determinants of Environmental Sustainability among Tertiary Students During the COVID-19 Pandemic. Aquademia, 5(2), ep21011. https://doi.org/10.21601/aquademia/11444

10. Magulod G.C (2022). Climate change awareness and environmental attitude of College students in one campus of a State University in the Philippines. Journal of Biodiversity and Environmental Sciences, 2018, 12 (2), pp.211-220. ffhal-03544223

11. Rahman, H.A. (2020). Environmental Sustainability Awareness in Selected Countries.,Universiti Putra Malaysia, Asia. DOI: 10.6007/IJARBSS/ v10-i15/8235

12. Mustapha, M.L.A., Muhammed, S.A.,Yusu,J.(2022)., Impact of Climate Change Awareness on Undergraduate Socio-emotional Well-being in Nigeria. University of Ilorin, Nigeria. International Journal of Emotional Education. v14_pp53-67.

13. Wardhana, D. Y. (2023). Environmental awareness, sustainable consumption, and green behavior amongst university students. UniversitasAtma Jaya Yogyakarta. Copyright 2022 GMP Press and Printing. ISSN: 2304-1013 (Online); 2304-1269 (CD-ROM); 2414-6722 (Print).

14. Barr, J.C. (2022)., Measuring Environmental Attitudes of Undergraduate Sustainability Students., Dalhousie University, Nova Scot

15. Malhi Y, Frankin J, Seddon N, Solan M, Turner M.G, Field C.B, Knowlton N. (2019)., Climate change and ecosystems: threats, opportunities and solutions. Phil. Trans R. Soc. B 375: 2019104 http://dx.doi.org/10.1098/rstb.2019.0104

16. Nazir, S.; Zhaolei, L.; Mehmood, S.; Nazir, Z. (2024)., Impact of Green Supply Chain Management Practices on the Environmental Performance of Manufacturing Firms Considering

Institutional Pressure as a Moderator. Sustainability 2024, 16, 2278. https://doi.org/10.3390/su16062278

17. Akintunde, E. (2017)., Theories and Concepts for Human Behavior in Environmental Preservation., University of Jos, DOI: 10.26502/jesph.96120012