



Green taxation changes government revenue and its applicability in Bangladesh



 **Md. Faykuzzaman Mia¹⁺**

 **Muhaiminul Islam²**

 **Nahin Rahman³**

^{1,2,3}Department of Accounting and Information Systems, Bangabandhu Sheikh Mujibur Rahman Science & Technology University, Gopalganj 8100, Dhaka, Bangladesh.

¹Email: faykuzzaman@bsmrstu.edu.bd

²Email: muhaiminulbsmrstu16@bsmrstu.edu.bd

³Email: nahin.16ais036@bsmrstu.edu.bd



(+ Corresponding author)

ABSTRACT

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Keywords

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An inclusive environmental green tax is a tax levied on all expenses and income related to the environment to protect the environment and reduce the pressure on the general sector of national revenue. Green tax is levied on industry, corporations, and individuals who through carbon emissions, various chemical emissions, and various greenhouse gases emissions into the environment. To expand the revenue sector, it is first necessary to determine how much expenditure and revenue generated. Most of the government revenue is spent on the mitigation of environmental impacts directly or indirectly. Bangladesh is yet to impose a green tax. In the fiscal year 2014-15, a 5% green tax was proposed but it was not implemented. Developed countries, are working for the proper implementation of green tax constantly by imposing the green tax. Bangladesh collects revenue by levying only certain vehicle registration fees, excise duty, and small changes in the industry, forest, agriculture, and transportation sectors. Bangladesh is more spent than revenue in these sectors. The analysis of the results shown that if the green tax can be imposed in Bangladesh, it will play an effective role in increasing the revenue of Bangladesh's Sustainable Development and long-term financial stability.

Contribution/ Originality: The research paper aims to increase the revenue of the government in the green taxation sector. Green taxation addresses the impact on the government's budget. To raise awareness among all the citizens and industrial establishments imposing taxes properly on environment sectors and reducing budget deficits by creating new sectors.

1. INTRODUCTION

Green taxation helps the government for monitoring the country's carbon emissions to set a standard taxation system for various carbon-emitting companies or industries. Green taxation plays an important role for developing countries by keeping their environmental pollution and implementing green taxes. Expenditure contraction along with revenue growth of the government to achieve economic stability. The revenue will increase if the government can levy the right taxes to formulate and implement appropriate plans to reduce short-term expenditure through long-term planning. Despite playing a leading role in achieving the Millennium Development Goals Bangladesh still lags behind others in implementing green taxes. As a result, maintaining economic stability has become challenging for Bangladesh. Failure to levy proper taxes leads to a loss of national revenue and budget deficit to increase spending. To implement the proposed budget of the government, then the dependence on foreign loans and

remittances has to be increased, which never contributes to the long-term development of a country. When the volume of remittances falls and the amount of foreign loans and aid falls, this effect adversely affects development activities within Bangladesh. As a result, it becomes difficult to implement the proposed long-term plans. Bangladesh's constitution states "The State shall endeavor to protect and improve the environment for its present and future citizens and to conserve and protect natural resources, biodiversity, wetlands, forests, and wildlife." So the combined development of the country's economy, society, and environment has become a must for every people in Bangladesh (Islam, Rahman, Sodesh, & Saha, 2022). To ensure environmental sustainability, there are significant targets under the 20% forest coverage, improving air quality in major urban areas, canal restoration and protection, wetlands, coastal zone protection, and environmental considerations (SFYP, 2015). Budget allocations have been increased for all these projects to address the disaster risk management to meet all these environmental expenditures. Through this, the environmental revenue will increase in the national revenue sector and the environmental deficit will reduce.

Bangladesh's economic growth has been increasing for the past few years but it is accelerating due to environmental disasters (MoF, 2015). But now the financial system of Bangladesh has deteriorated somewhat due to post corona situation and the impact of war and now Bangladesh is going through tough challenges. It is widely argued that in developing countries there is a lack of resources as opposed to the pressure of massive economic development to meet the needs of the people (Narula, 2000). The pressure on the environment caused by the excessive use of natural resources leads to environmental degradation. Bangladesh is no exception because the most populous country in the world and the population density is very high. Where excessive carbon emissions and greenhouse gas emissions occur. Although there has been a great development in Bangladesh's communication facilities, power generation, industrialization, and agriculture, due to the non-imposition of taxes from these sectors, the government is not able to enjoy the benefits but is facing losses every year (MoF, 2015). It is an unfortunate fact that despite Bangladesh's incredible development in all these sectors, the environment is being degraded due to the lack of emphasis on the environment. Bangladesh believes that can be sustained if an environmental change is taken into account and imposed on those sectors in a coordinated manner. In the era of globalization all government departments, private departments, and industrial machinery are facing challenges in working especially in the environmental sector such as development activities, construction projects, and all types of projects that have an impact on the environment. To keep pace with globalization, every country is having an impact on the environment.

2. OBJECTIVE OF THE STUDY

The objective of this research work is to formulate a specific tax plan in environment sectors and to work towards the implementation of the green tax. Keeping in view the environmental challenges as well as the development vision, it is time to transform Bangladesh into a green economy. Because a green economy is an economic system that efficiently reduces the level of carbon emissions and helps to reduce the risk of future generations. However, the greening process faces many challenges. But to make it more sustainable considering the long-term interest, the green tax will work towards the formulation and implementation of a green economy plan in all environment-related sectors of Bangladesh. In the background of green tax, the present research work has undertaken a green revenue which increases the economic stability and government revenue. The current exercise in Bangladesh the sustainable development against environmental degradation.

The following objectives are as follows:

- Evaluating the existing financial systems in our country to identify the problems and work out what solutions can be provided.
- By studying the existing economy of Bangladesh, which sectors are under green tax and find out how much tax will be accepted in any sector.

- To study and identify the potential of greening the financial system to coordinate the greening process for the existing economy of Bangladesh.
- To manage the overall activities of a country, a proper budget has to be formulated and the revenue sector has to be expanded for this budget formulation.
- To levy a green tax to reduce global warming, as well as to protect economic stability by taxing companies or industries that aim to build a country's eco-friendly economy.

Besides, developing an environment-friendly tax policy where industries do not disrupt their production.

3. LITERATURE REVIEW

It is assumed that direct energy consumption and other costs also change as the population increases. They are directly related to the environment (Holdren & Ehrlich, 1974). The growing population in Bangladesh faces pressure energy demand day by day to meet its social, economic, and daily life obligations. As a result, various types of waste and polluting substances mix with the environment and create havoc in the environment, and the conservation of this environment becomes inevitable. And green taxation has proved to be a deterrent to reducing all these intensities. Even Europe's energy demand would have doubled if the green tax had not been imposed. At present, excessive green tax is being imposed in European countries and it is playing a role in protecting the balance of the environment (Symons, Proops, & Gay, 1994).

According to (UNEP), a green business is an environmentally friendly economic system that ensures human and social well-being as well as security while reducing environmental impacts (UNEP, 2012a). The (UNEP) launched the green business initiative for environmental and financial stability in 2008, and many other countries joined Organisation for Economic Cooperation and Development (OECD) listed countries (UNEPFP, 2013). Three programs of the green economic initiative are managed by UNEP; Green Economy reports, advisory services, and extensive research. Each country has prepared a green report prioritizing environmentally friendly investments to transform their economies towards green finance. The main themes of a green economy assessment and innovation all over the world are now trying to transition. Here the emphasis is placed on green taxation (UNEPFP, 2013).

In the European Union (EU), industries that reduce pollution have been shown to increase environmental productivity and switch to renewable energy. In Turkey, environmental taxes are paid as well as dividends, which increase government revenue and addition benefits to environmental tax from imported fuels and related products (Kumbaroğlu, 2003).

Environmental taxation policies are still in the initial stages in developing countries of the world, and many countries are already in the process of enacting environmental taxation. India was the first Asian country that charge tax on both coal-produced and imported coal. They introduced 50 rupees or US\$1.05 on reimbursable coal in 2010 (Muthukumara, 2014).

It would not be reasonable to impose the same type of tax on all industries, so the type of green tax should be different for those industries that emit excessive carbon under the green tax (Fullerton, 2008). The tax laws and the political pressure on these thunderbolts, which may be catastrophic, must be equitable and fair. By implementing the use of new technology, the government will be able to easily collect its tax dues from industrial establishments. Timely payment of Green Tax is considered a policy instrument in the UK (David, 2006).

Green Tax It is reasonable for prominent economists and environmentalists that pollution levies and taxes are effective instruments for environmental purposes in which carbon emission levels are reduced while increasing the country's revenue (Baumol, 1988).

Both simulation models and practical experience show that a green tax can be effective in reducing a country's environmental degradation (Symons et al., 1994). The green tax has increased the country's revenue and changed the greening of the industry (Srivastava & Rao, 2010).

UNEP identified fiscal policy options which include; green tax, (environmental tax), charges, subsidies, exclusion of environmental waste subsidies, and spending for reducing losses, etc. And it is essential to evaluate the existing revenue system before imposing green tax (UNEP, 2012a).

The macroeconomic indicators such as gross domestic product (GDP) growth, inflation, exports, imports, remittances, foreign exchange reserves, etc. to analyze the national budget in Bangladesh 2014-2015. Analyzed trends by taking the year as the base year 2005-2006 to 2014-2015 (Bhattacharya, 2014).

UNEP conducted a separate study on Mauritius and analyzed the financial indicators, and the total environmental budget & expenditure. And this report will play a leading role in formulating green policies.

Various international organizations such as UNEP, the Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ), and OECD have been involved in understanding the applicability of green economy in different economic contexts and identified key challenges. Apart from that, some studies have been done on environmental finance. Bangladesh has not yet conducted any such survey, although conducting such research and survey is very important for environmental and disaster response in a country like Bangladesh. Bangladesh has to come up with a development strategy and emphasize green tax. In this background, this paper can be assumed to be of high relevance and the importance and concept of the Green Tax in the future are believed to be helpful.

4. METHODOLOGY OF THIS RESEARCH

This research paper is following the secondary data and scoping to analyze the tax revenue and expenditure of the government budget of Bangladesh to link the importance of green taxation and sustainable economic development. The paper has been prepared by studying the environmental-related data and it has been found that the direct involvement of environmental-related data is less and the data is not directly available. So the environmental-related data have been analyzed for quite some time. Most of the environmental-related information has been collected from the website of the Bangladesh Ministry of Finance (MoF), the Ministry of Environment (MoE), and BBS. In addition, the environmental activities of the World Bank and OECD have been analyzed and the tax levied by developed countries on the level of carbon emissions has been brought into consideration in this report.

To evaluate the existing financial system, how the trends in desired areas like the proposed budget, budgeted revenues and expenditures, GDP growth, inflation reduction, tax levy on investment sectors, etc. are analyzed. To identify green revenue from the budget analysis by using a t-test where variables are the actual budget, environmental expenditure, and revenue. The relationship between the variables of environmental expenditures and revenues by Ordinary least-squares (OLS) regression analysis. Data analysis was done by ANOVA test from the data of revenues, expenditures, and budget. To assess the financial system, considering the macroeconomic determinants as well as the current financial system, increasing the annual GDP growth and increasing the government revenue as well as reducing inflation by imposing a carbon tax to balance the environment. This study uses financial variables like total revenue, environmental expenditure, environmental revenue, and budget deficit.

The analysis of the present study used for testing null and alternative hypotheses and t-test, ANOVA test, and so on are as follows:

Null Hypothesis (H₀): The actual and proposed budget, revenue, expenditure, and related statements are no different from the variables. The significance level of the null hypothesis is (H₀) when the p-value is equal and it's accepted.

Alternative Hypothesis (H₁): The actual and proposed budget, revenue, expenditure, and related statements are different from the variables. The significance level of the alternative hypothesis is (H₁) when the p-value is not equal and it's accepted.

Using IBM SPSS and Excel Data Analysis Tool software the hypothesis test from financial year (FY) 2011-2012 to FY 2020-2021 which means 10 years value is considered. The test is a 95% confidence interval and the value of the tested variable.

A study approach is used to identify potential environmental data for potential financial reforms to introduce a carbon tax in Bangladesh. This paper uses a systematic approach by combining limited quantitative analysis and focusing on both general and environmental taxes and subsidies that will help increase the country's revenue. The influencing factors of environmental revenue & expenditure data are collected for the fiscal year 2011-2012 to 2020-2021(10 years). The variables measurement and expected effects for OLS regression with their units on national revenue are in Table 1. The variable data used for linear regression analysis results in Equation 1:

$$Y = \alpha + \beta_i X_i + \varepsilon \tag{1}$$

Now, Y = Categorical dependent variable, α = intercept, β = regression coefficient; $i = 1, 2, 3, 4, \dots, 12$ ε = error term, X_i = Independent variables, X_1 = Fuel and Energy, X_2 = Transportation, X_3 = Industrial, X_4 = Agriculture, X_5 = Environmental & Forest, X_6 = Disaster Management, X_7 = Motor Vehicle TAX, X_8 = Land DEV TAX, X_9 = Fine & Penalty X_{10} = Export Duty, X_{11} = Import Duty, X_{12} = CO₂ emission.

Table 1. The categorical variable of environmental revenue & expenditure.

Categorical variable	Description	Measurement	Expected sign
Environmental items	Impact on stability	Units/Year/Production	Independent variables
Environmental exp:			
Fuel and energy	Usage per capita	% of Gallon	+
Transportation	Expectation of life	Year	+
Industrial	Usage mineral reso.	% of production	+
Agriculture	Usage of chemical	% of production	+
Environmental & forest	Destroy	Per product	+
Disaster management	Subsidiary per capita	% of GDP	-
Environmental revenue:			
Motor vehicle tax	Vehicle per Cubic capacity (CC)	Mega tonnes of oil equivalent (MTOE) per year	+
Land dev. tax	Per hector	Per unit square	+
Fine & penalty	Break environmental law	By the law	+
Export duty	Volume of export	BDT	+
Import duty	Volume of import	BDT	+
CO ₂ emission	CO ₂ emission per capita	MTOE per year	+

Sources: Ministry of finance in Bangladesh & OECD.

Multiple methods are used to collect data and analyze that data and apply linear regression to find relationships between environmental income and expenditure and other environmental variables. The beta value (standardized regression coefficient) is used to measure how much each of the independent variables influences by the dependent variable. Using the R-squared value is determine and measure the goodness or fit of the data. The F-statistics model is understood the overall fitness of the data. Finally, the models used is assessed through the ANOVA (analysis of variance) test. Using Equation 1 if the coefficient value is statistically significant then it can be said that both changes in environmental factors are significant. VIF test is also performed to assess the multicollinearity of explanatory variables on the effect of these variables. It is assumed that some variables do not heteroscedasticity among the explanatory and regressed variables, but some variables do.

5. GREEN TAX SCENARIO

Many countries under the United Nations Framework Convention on Climate Change (UNFCCC) have participated in the Kyoto Protocol and other international agreements reduction of Greenhouse Gas (GHG) targets. Using the Emissions Trading System (ETS) helps to reduce carbon emissions through various flexible mechanisms and establish carbon markets.

The EU is the first world's ETS market and largest carbon market working towards the implementation of the provisions of the Kyoto Protocol. The World Bank predicted that the market has huge potential and the developed

countries are reaping the benefits as well as the level of carbon emission has been decreasing since the last decade. Over time, the base of green tax for environmental tax has expanded. In developed countries of the world, green taxation, including energy taxation, has gone a long way. Other taxes such as green taxes exist in France, Finland, Greece, Sweden, the United Kingdom, and Norway. Although car tax, vehicles tax, Waste tax, noise tax, transportation tax, etc. are covered by the green tax (see Table 2).

Table 2. Impact of international and national evidence of green taxation.

Country name	Period	Impact on green taxation	Source
Australia	1994-2022	Australia charges a green tax on waste and environment, passenger movement, land-based sewage discharge, illegal waste dumping fines, road & transport duty, electronic devices, CO ₂ emissions, mineral oils, and additional environmental outlays, etc.	OECD (1990-2022)
Finland	1990-2022	Finland charges a green tax of 7 % lower CO ₂ emissions than a carbon tax shift to output tax. But more than 7% pay a carbon tax of 1997 £0.55 per liter, a CO ₂ emission of 10.69 € per MWh natural gas.	(Nordic Council, 2006)
China	2008	China charges a green tax on diesel, kerosene, jet fuel, etc. 1.20 Chinese yuan (CNY) per liter. The international & domestic flights' airport fees are 90 & 50 CNY per passenger. China also charges motor vehicles, import products, and waste management tax.	OECD (1990-2022)
Denmark	1992	Denmark charges a green tax on natural gas & non-biodegradable waste used as fuel tax of 0.4030 & 178.5 Danish krone (DKK) per ton. It also charges CO ₂ emissions less than 6% down get 2% subsidies, and a 23% reduction in carbon emission gets a 26 % subsidy.	(Nordic Council, 2006) OECD (1990-2022)
Norway	1991-2007	Norway charges a green tax on CO ₂ emissions of 21% on power plants. The people pay tax from 1995 environmental tax (ET). CO ₂ reduction in the 1990s was 14%. If 2 % of CO ₂ emission reduce then the carbon tax 12 % exemption. Norway charges a tax on Liquefied Petroleum Gas (LPG) of 3.48 Norwegian krone (NOK) per kg.	OECD (1990-2022) (OECD, 2001)
Sweden	1990-2020	Sweden charges a green tax of 20% on CO ₂ emissions not higher than emissions without a carbon tax pay.	(Nordic Council, 2006)
Nordic Council	1999-2020	Nordic council charges a green tax on less than 3.5 % of carbon emissions.	(Nordic Council, 2006)
Germany	1999-2008	Germany charges a green tax, environmental tax, transportation tax, fuels tax, and electricity tax. Germany is reducing CO ₂ emissions by 15 % from 1990 to 1999.	OECD (1990-2022)
United Kingdom (UK)	2001-2010	UK charges a green tax of 2.25 % on CO ₂ emissions in 2002 and 2003. Uk charges a registration fee of 150.0 Great Britain Pound(GBP) per year use of motor vehicles that emit 16.5 million tons of carbon. Uk charges a green tax of 183.1 € per million tons of carbon emission.	(HMT, 2006)
India	2005-2010	India charges a carbon tax per ton of Rs 50 & 300 crore annually. The tax charges day by day increase.	(Srivastava & Rao, 2010)
Bangladesh	2014-2015	Bangladesh proposed a 5% Green Tax(GT) but was not implemented. Only Bangladesh receives environmental charges, vehicle registration fees, etc.	(MoF, 2015)
Canada	2010-2022	Canada charges a green tax on waste management of individual products of 0.40 Canadian Dollars (CAD) per item. The federal tax rate is 0.653 CAD per liter on 3000cc (Cubic centimeters) per vehicle.	OECD (1990-2022)
United States	1994-2022	The United States charges a tax on noise pollution, water abstraction, aviation, and hazardous waste. United States charges a tax on carbon emissions of 11.50 USD per ton in 1994,	OECD (1990-2022)
France		France charges a green tax on noise pollution, CO ₂ emissions related to motor vehicles & others.	

Source: Green fiscal commission 2009; OECD 1990-2022.

6. RESULT AND DISCUSSION

6.1. The Assessment of Trend of National Budget Growth Mechanism

The Bangladesh Ministry of Finance has published before starting the following financial year the budget growth for the FY 2011–2012 to 2020–2021. The trend of the annual budget and deficit rate is based on the National Board of Revenue (NBR) in Figure 1.

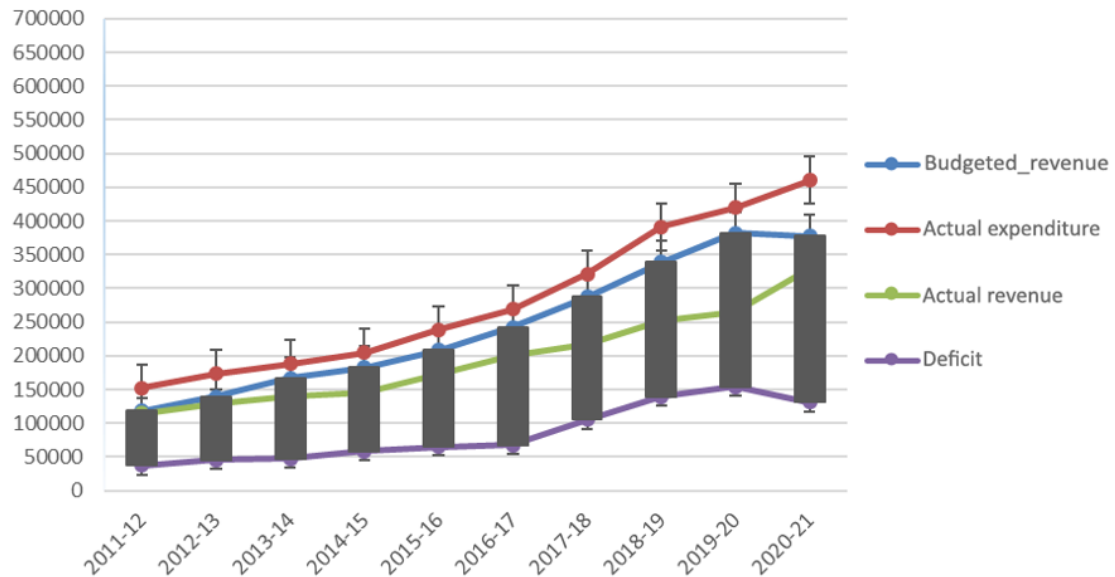


Figure 1. Trend of national budget growth (see Table A1).

In this model as dependent variables, the independent variables are energy and power, transport, industry, agriculture, environment & forest, and disaster management are seen as proxy variables for national income taking the budget. 10 years of data are collected and observed from the fiscal year 2011–2012 to 2020–2021 where the number of observations is 10. The overall significance test through the F-statistic model showed that F-value is 4.88 which is less than F critical value ($2.53 < 3.18$) which is represent significant. The value indicates that the study rejected the null hypothesis (see Table A1.1 & A1.2). From the value of R-square (R^2) it is seen that the regression value is 1 and the adjustment R-square value is 1. This independent variable is assumed to have nearly 100% change power so all the variable variables will contribute to the growth of national income (See Table A1.2).

Through regression analysis, it is clear that environmental variables should be given importance in improving both national revenue and taxes by significantly influencing the budget, which includes environmental factors. This will help Bangladesh achieve medium to long-term sustainable development in achieving higher tax revenue and environmental protection.

6.2. Allocation of Sectorial Deficit Contribution to the Budget.

A deficit budget is created by subtracting total expenditure from our total revenue collection. Environmental revenue is a bit difficult to identify by considering potential sectors. The environmental deficit budget is shown by determining environmental revenue and expenditure where 70% of the total budget deficit is generated from the environmental sector. In the environmental sector, we can reduce this deficit by imposing a green tax. Besides this, the national revenue income will increase and play a leading role in protecting the environmental balance. In the financial year 2011–12, the total deficit budget was 37727 out of which the deficit budget of the environmental sector was 24341. From here, the deficit budget increased to 105308 in the fiscal year 2017–18 and the total deficit budget reached the highest level in the fiscal year 2019–20 to 154252 in 2020, the deficit budget slightly decreased from the previous two years to 131495 expressed in Figure 2 and Figure 3 (see Table A2).

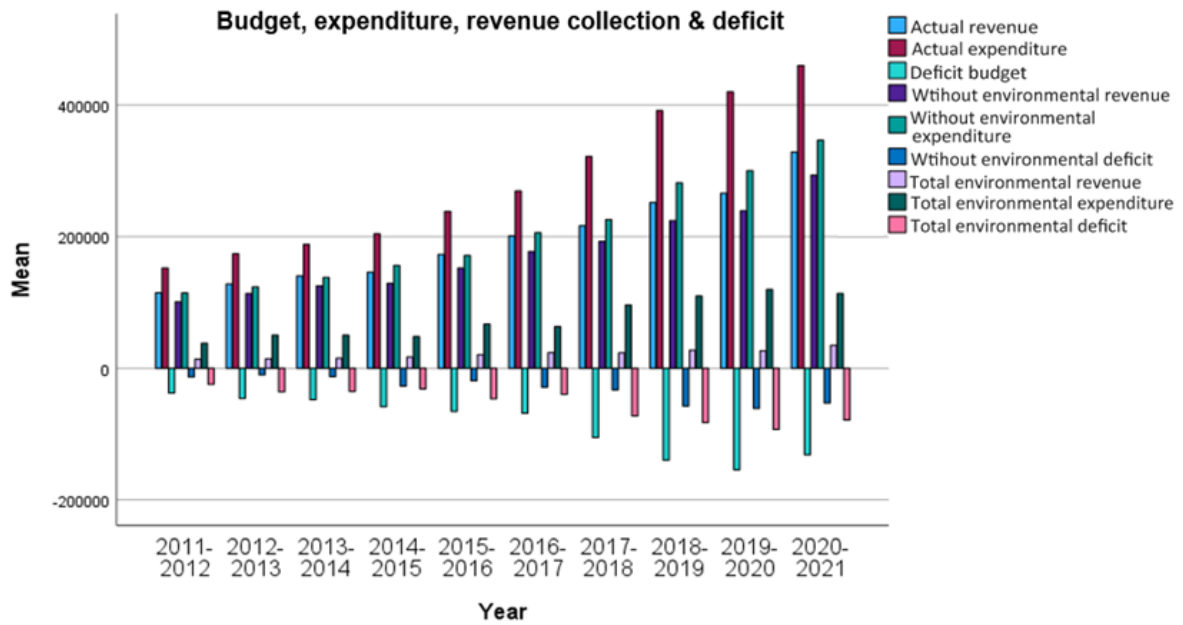


Figure 2. Sectorial contribution to the budget environmental, without environmental and deficit (see Table A2).

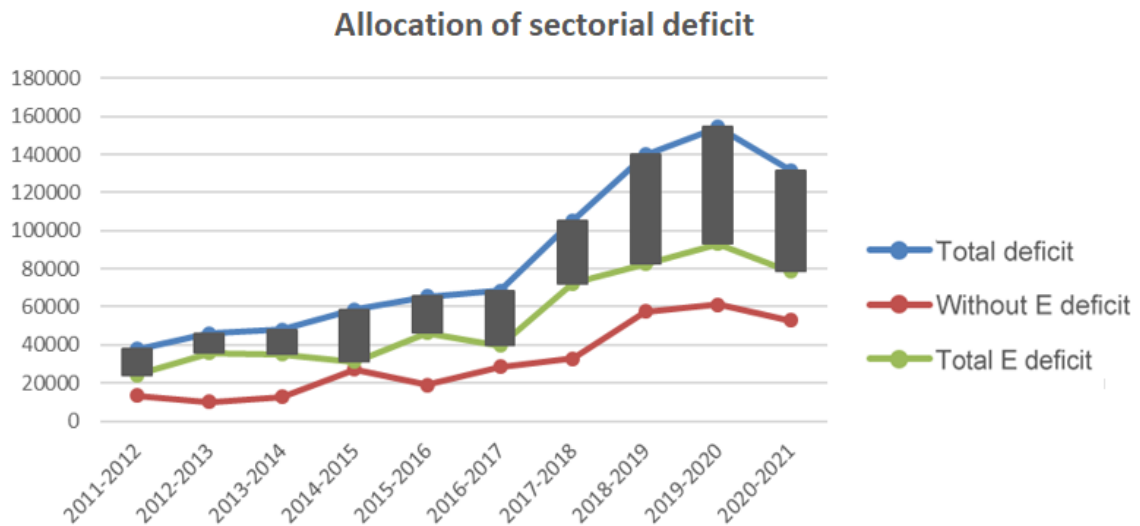


Figure 3. Environmental deficit & total deficit (see Table A2).

6.3. Allocation of Environmental Sectorial Expenditure Contribution to Budget

To identify why green tax is important for our national revenue. In addition to the increase in the cost of environmental expenditures, environmental degradation is also causing excessive carbon emissions through the use of materials that are adversely affecting the environment. The potential environmental variables are shown using OLS regression model analysis where R-square (R^2) equals 0.9983 and adjusted R-square equals 0.9949 (see Table A3.1). That indicates that about 99.49% of the environmental costs can be changed by changing the independent variables where environmental taxes can be imposed in addition to cost reductions(see Table A3.1). The T-test shows that the value of t is greater than the critical value of t ($t > 1.812$) the null hypothesis is rejected. Here p -value and p -critical value are less than at a 5% level. So alternative hypothesis is accepted by rejecting the null hypothesis (see Table A3.1). In this model as dependent variables, the independent variables of Fuel and Energy, Transportation, Industrial, Agriculture, Environment & Forest, and Disaster Management are seen as proxy variables for national income taking the budget. 10 years of data are collected and observed from the fiscal year 2011-2012 to 2020-2021 where the number of observations is 10. Using the F-statistic model the value of F is 0.000298 which is less than the significance level of 0.05 is represent less significant where the study rejects the null

hypothesis. Therefore, imposing taxes on the respective sectors will increase the significant level, i.e. the significance will increase (see Table A3.1). Regression analysis showed that the R-squared (R²) value was 0.9983 and the adjusted R-squared value is 0.9949. That indicates that about 99.49% of the environmental costs can be changed by changing the independent variables where environmental taxes can be imposed in addition to cost reductions. The volume of Fuel and Energy, Transportation, Industrial, Agriculture, Environment & Forest, and Disaster Management which is measured by BDT has a significant impact on national expenditure. A 1-unit increase in the amount of Fuel and Energy, Transportation, Industrial, Agriculture, Environment & Forest, and Disaster Management led to 0.022%, 0.0082%, 0.026%, 0.196%, 0.099%, and 0.106% additional expenses respectively from environmental expenditure which helps to impose tax revenue. It means that if a tax on the environmental expenditure sector is imposed, the revenue increases by 0.05%. (see Table A3.1).

The Variance Inflation Factor (VIF) test is performed to check for multicollinearity among variables where VIF values for each selected variable are greater than 1 and less than 10, indicating no multicollinearity problem (see Table A5). So Fuel and Energy, Industrial, and Agriculture are multicollinearity problems of the explanatory variables are not significant (where VIF>10) and transportation is a close multicollinearity problem where the value VIF is 9.458. On other hand, Environment & Forest and Disaster Management are below 10 (VIF<10). So Environment & Forest and Disaster Management are not multicollinearity problems of the explanatory variables are significant (where VIF<10). The explained variables are graphed and their relationships are shown in Figure 4 and 5. A coefficient correlation test is done considering a 5% significant level. Where the value of p is greater than the significant level (p-level 0.85) at 5% which represents a high level of significance. In the case of environmental expenditure, which is measured by the national expenditure of budget and operation of a country. But the p-value of Fuel and Energy, Transportation, and Industrial is less than 0.05 (p<0.05) a low level of significance at 5% level. The p-value of Agriculture and Disaster Management is greater than the significance at the 5% level (see Table A3.1). Analysis of Variance (ANOVA) showed that the p-value greater than (p=0.077>0.05) at the 5% level of significance which revealed a high level of significance (see Table A3.1).

It is clear from the regression results that environmental variables significantly affect government revenue. Therefore environmental variables can be taxed. Which can help to achieve higher environmental growth in the revenue sector of the Bangladesh government. The variables are shown in the Figure 4 and 5 (see Table A3.1).

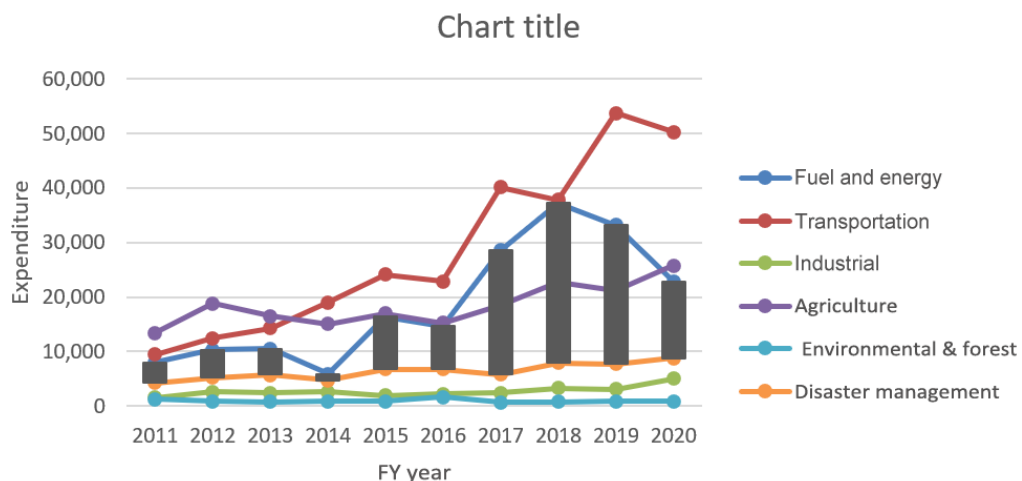


Figure 4. Cross relation among Sectorial environmental expenditure. (see Table A3).

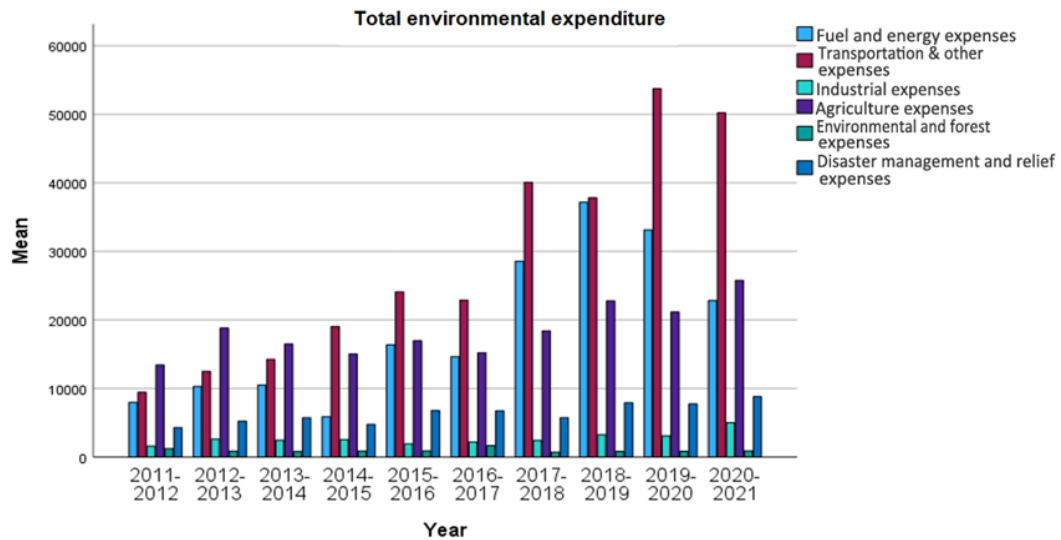


Figure 5. Environmental expenditure (see Table A3).

6.4. Allocation of Environmental Sectorial Revenue Contribution to Budget

The Bangladesh government proposed a 5% green tax in the 2014–15 fiscal year on top of the polluters who conduct activities such as carbon emissions. But it has not yet been implemented resulting in no direct revenue earning from environment tax but some revenue earning indirectly. The NBR of Bangladesh is impose charges, fees, and penalties on related issues affecting the environment. The industrial sector polluted air, water, and soil pollution in particular. Bangladesh government levy tax on environmental activities which is reducing the negative externalities.

The potential environmental variables are shown using OLS regression model analysis where R square (R^2) equals 0.9821 and adjusted R square equals 0.9598 (see Table A4.1). That indicates that about 95.98% of the environmental revenue can be changed by changing the independent variables where environmental taxes can be imposed in addition to cost reductions and increase revenue (see Table A4.1). The T-test shows that the value of t is greater than the critical value of t ($t > 2.26$) the null hypothesis is rejected. Here p-value and p-critical value are more than at a 5% level. So alternative hypothesis is accepted by rejecting the null hypothesis (see Table A4.1). In this model as dependent variables, the independent variables of motor vehicle tax, land development tax, fine & penalty, export duty, and import duty are seen as proxy variables for national income taking the budget. 10 years of data are collected and observed from the fiscal year 2011–2012 to 2020–2021 where the number of observations is 10. Using the F-statistic model the value of F is 0.00137 which is less than the significance level of 0.05 and is found to be less significant where the study rejects the null hypothesis. Therefore, imposing taxes on the respective sectors will increase the significant level, i.e. the significance will increase (see Table A4.1). Regression analysis showed that the R-squared (R^2) value was 0.9821 and the adjusted R-squared value was 0.9598. That indicates that about 95.98% of the environmental revenue can be changed by changing the independent variables where environmental taxes can be imposed in addition to revenue to cost reductions. The volume of motor vehicle tax, land development tax, fine & penalty, export duty, and import duty which is measured by BDT has a significant impact on national revenue. A 1-unit increase in the amount of motor vehicle tax, land development tax, fine & penalty, export duty, and import led to 0.022%, 0.0082%, 0.026%, 0.196%, 0.099%, and 0.106% additional expenses respectively from environmental expenditure which helps to impose tax revenue. It means that if impose a tax on the environmental expenditure sector, the revenue increases by 0.05%. (see Table A4.1).

The volume of Motor Vehicle TAX, Land Development (DEV) TAX, Fine Penalty, Export Duty, and Import Duty which are measured in BDT has a significant impact on national revenue. A 1-unit increase in the amount of Motor Vehicle TAX, Land DEV TAX, Fine Penalty, Export Duty, and Import Duty led to 0.67%, 0.58%, 0.85%,

0.54%, and 0.017% respectively from environmental revenue which helps to impose tax revenue. It means that if impose a tax on the environmental revenue sector, the revenue increases by 0.05% significant level (see Table A4.1).

The Variance of Inflation Factor (VIF) test is performed to check for multicollinearity among variables where VIF values for each selected variable are greater than 1 and less than 10, indicating no multicollinearity problem (see Table A5). So Motor Vehicle TAX, Land DEV TAX, and Import Duty are not multicollinearity problems of the explanatory variables significant (where $VIF < 10$), and Fine & Penalty is a close multicollinearity problem where value VIF is 9.363, but it is significant. On other hand, Import Duty is above 10 ($VIF > 10$). So Import Duty is a multicollinearity problem of the explanatory variables is not significant (where $VIF < 10$). The explained variables are graphed and their relationships are shown in Figure 6 and 7. A coefficient correlation test is done considering a 5% significant level. Where the value of p is greater than the significant level (p-level 0.49) which presents a high level of significance and the alternative hypothesis is accepted by rejecting the null hypothesis.

In the case of environmental revenue, which is measured by the national revenue of budget in Bangladesh. The p-value of environmental revenue is 0.49 revealing a high level of significance at a 5% level for motor vehicle tax, land development tax, fine & penalty, and export duty. But the p-value of import duty is less than 0.05 ($p < 0.05$) a low level of significance at a 5% level (see Table A4).¹ Analysis of Variance (ANOVA) showed that the p-value is more than 0.05 at the 5% level of significance which revealed a high level of significance during the ANOVA test (see Table A4.1).

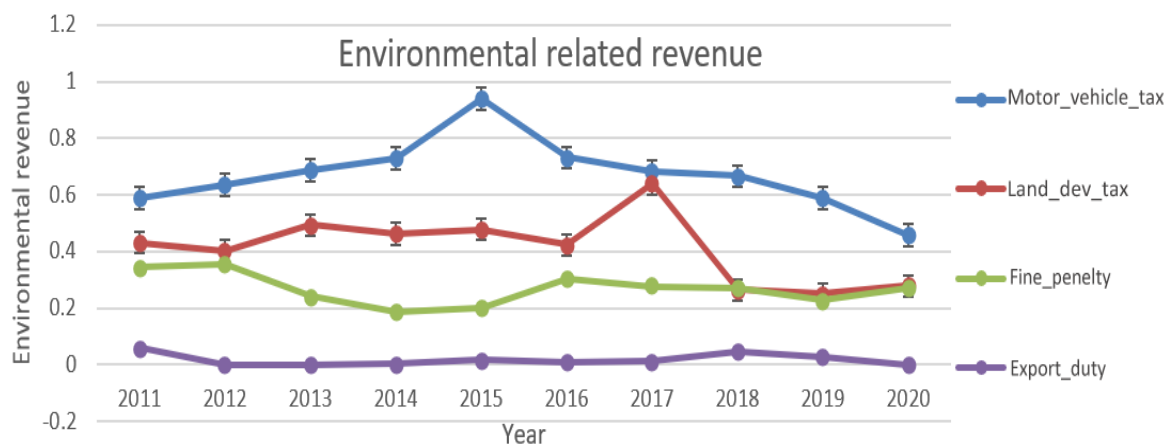


Figure 6. Cross relation among sectorial environment-related revenue without import. (see Table A4).

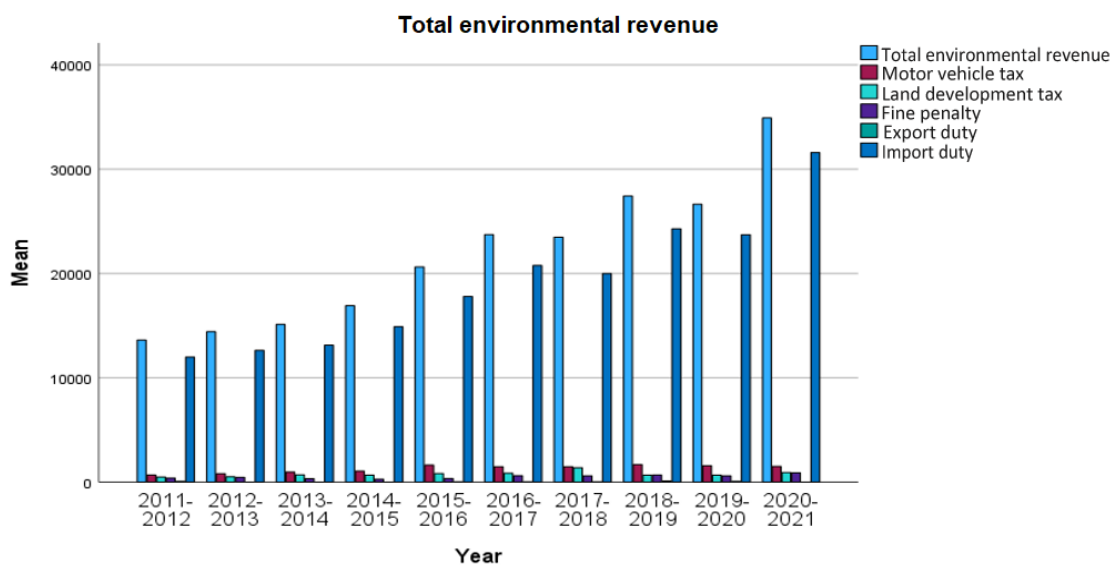


Figure 7. Total environmental revenue assuming (see Table A4).

7. FINDINGS & RECOMMENDATIONS AND IMPLEMENTATION IN BANGLADESH

Despite several environmental challenges in the country, we are constantly degrading the environment through carbon emissions. Bangladesh is not imposed an environmental tax to prevent these problems resulting in spending a large portion of the budget on this sector and creating a deficit budget due to the non-arrival of revenue. Although most of the policymakers are trying to impose a green tax it is not possible due to a lack of awareness in the corporate sector and a lack of public goodwill.

1. Green taxation increase a sustainable economy and sustainable development as well as revenue growth of a country. It not only brings long-term economic prosperity but also contributes to social security and environmental security and strengthens the country's finances.

2. Bangladesh currently has a large-scale environmental disaster for emerging industries and to this end, it can increase the country's revenue by imposing an environmental tax on all environmentally impacting materials or environmental-related materials.

3. To sustain the economy of Bangladesh and to keep the internal development, it will help to increase the revenue through green tax as well as increase the growth of GDP and protect the environmental balance.

4. If we want to live with high growth and per capita income then green tax is not an option. Through green tax, every citizen will improve their overall quality of life by raising their awareness as well as contributing to environmental conservation. Currently, most of the budget is being spent on a few sectors like the communication sector, the health sector, and so on as a result of which the amount of revenue has decreased and the budget deficit is increasing.

5. Currently, although the per capita income has increased in Bangladesh, the gap between the rich and the poor has not decreased but is increasing. Because the Bangladesh government does not impose a green tax, industrialists are refraining from paying green tax. As a result of which the adverse impact on the environment has increased the cost of living. Even if the government of Bangladesh wants to provide additional subsidies, it is not able to avoid the adverse effects of this environment because the revenue from this sector is not enough and as a result, it is not possible to spend enough on this sector.

By changing our development thinking and strategy and establishing a standard Green Tax i.e. Environmental Tax, the mentioned problems can be solved and the country's revenue will also increase. To address these challenges, a medium-term and long-term tax plan through environment taxation as part of the 'Order & Control' policy formulated by the NBR in all sectors involved in investment as well as in the corporate sector will help increase the country's revenue. Initiatives can help us as well as the government deal.

The present study can identify the potential areas in Bangladesh to address the aforementioned concerns as well as impose environmental taxes and charges to increase national revenue (see [Table 3](#)).

Table 3. Potential areas of environmental taxes.

<ul style="list-style-type: none"> Green taxes are charges on fuel, petroleum products, fossil fuels, and gasoline. It charges on the ticket per passenger. Green taxes are charges on nuclear, coal, hydroelectric power, wind power, solar energy, bottles, plastics, leather, paper & pulp, and other chemical industries. 	<ul style="list-style-type: none"> Green taxes are charges on fertilizer, fisheries, forest, and other agriculture industries. It charges registration fees on imported motor vehicles. Green taxes are charges on various greenhouse gas and carbon emission. It charges on drugs & medicine, soaps, and cosmetics industries. It charges on natural gas and oil.
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Environmental taxes can provide subsidies for sustainable development and reduction of carbon emission levels through technological changes in some cases, which will reduce long-term costs and increase national revenues, as

well as encourage industrial entrepreneurs and the public to pay green taxes. The possible areas of subsidy in the following sections to producers:

- Subsidy on the production of compost fertilizers which will reduce the use of artificial fertilizers.
- The subsidy can be provided for rooftop gardens, especially in megacities, Dhaka, Chittagong, and such big cities.
- To increase fish production using eco-friendly technologies by subsidizing Fishery Welfare Fund.
- To subsidize solar and wind power generation so as not to destroy the environment and promote sustainable development.
- Provide a refund scheme for plastic bottles and polythene like in the developed world to attract users.
- Payment of Carbon Rebate Subsidy
- Provide subsidies on jute and textile-related products to encourage industrial owners to use technologies that reduce carbon emissions and balance the environment.

8. CONCLUSION

Bangladesh is an emerging economy country and it is very important to impose an environmental tax to reduce the negative impact on the environment due to industrial expansion. Green economy and ecological balance ensure reducing environmental deficits and risks. Taxes on all expenditure and revenue sectors of the environment will contribute to the growth of national revenue as well as GDP. According to the WHO Air Pollution Report 2015, Bangladesh is among the top polluted countries. Water pollution, soil pollution, and air pollution are various types of carbon emissions and chemical storms are mixes with water and runoff on arable land. Imposing a green tax to discourage these activities will help increase national revenue and contribute to a sustainable economy.

Green tax will contribute to revenue generation as well as help in environment conservation. The green tax will help increase the country's national revenue by levying taxes on vehicles purchased in the transport sector, excise duty and vehicle registration fees, and taxes on all types of fuel used in vehicles. In addition to all the fuels used in the electricity sector, if a green tax is imposed on the direct electricity sector, it will contribute to the economy of the country and people will be economical in electricity consumption. Subsidize the import or production of green transport. Imposition of an environmental tax on products that pollute the environment like plastic, rubber, steel, bottles, etc. And subsidies can be given to reduce its pollution levels which, though an expense, is a long-term investment. To transform the country into a green economy, proper investment in the research % development (R & D) sector by identifying appropriate taxes along with subsidizing environment-related sectors will increase revenue.

Finally, say if we tax our traditional income it will play the opposite role in increasing our revenue. Because a huge amount of money has to be spent on the environmental-related sector from the national budget. Therefore, to properly collect the money from the national budget, we must impose appropriate taxes on all sectors related to the environment in addition to general taxes, the national revenue will increase. So we can define this tax through a concerted effort of government policymakers as well as all policymakers of the private and corporate sectors to define green tax. Which will play a leading role in our national revenue base.

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Appendix A: Proof

Table A1. Total budget, revenue & deficit.

FY year	Total budget, revenue & deficit						BDT in crore	
	Budgeted revenue	Revised budget	Actual revenue	Deficit revenue	Tax revenue	Non tax revenue	Foreign grants	Total revenue & grants
2011-12	118385	114885	114693	-3692	95.228	19.465	3.566	118.259
2012-13	139670	139670	128128	-11542	107452	20.676	6.879	135.007
2013-14	167459	156671	140375	-27084	116031	24.343	6.357	146.731
2014-15	182954	163371	145966	-36988	128798	17.167	2.324	148.289
2015-16	208443	177400	172951	-35492	151886	21.066	1.889	174.841
2016-17	242752	218500	201210	-41542	178075	23.136	701	201.912
2017-18	287990	259454	216556	-71434	194327	22.229	868	217.424
2018-19	339280	316612	251879	-87401	225957	25921	1677	253.555
2019-20	381978	351523	265908	-116070	221981	43.927	2.520	268.428
2020-21	378000	351532	328665	-49335	269803	58862	2348	331.013

Table A1.1. F-Test of actual revenue & actual expenditure variables.

F-Test for variances		
	Actual expenditure	Actual revenue
Mean	282082.2	196633.1
Variance	1.22	4.82
Observations	10	10
df	9	9
F	2.529	
P(F<=f) one-tail	0.091	
F Critical one-tail	3.178	

Note: Actual revenue & actual expenditure variables.

Table A1.2. t-Test, regression statistics, coefficients, and ANOVA test.

t-Test: Assuming variances					
Description	Deficit				
Mean	-85449.1				
Variance	1876179919				
Observations	10				
Hypothesized mean difference	0				
df	15				
t stat	-10.898				
P(T<=t) one-tail	7.958				
t Critical one-tail	1.753				
P(T<=t) two-tail	1.591				
t Critical two-tail	2.131				
Summary output					
Regression statistics					
Multiple R	1				
R Square	1				
Adjusted R square	1				
Standard error	1.189				
Observations	10				
ANOVA					
Test result	df	SS	MS	F	Significance F
Regression	2	16885619269	8.44	5.97	4.882
Residual	7	9.901			
Total	9	16885619269			
Detail	Coefficients	Standard error	t stat	P-value	
Intercept	0	1.328	0	1	
Actual revenue	1	3.589	2.79	2	
Actual expenditure	-1	2.257	-4.4	7.9	

Note: Independent variable deficit budget.

Table A2. Sectorial contribution to the budget environmental, without environmental information and deficit.

FY year	Actual revenue	Environmental & without environmental information						BDT in crore		Total E deficit	% of E deficit
		Actual expenditure	Total deficit	Without E revenue	Without E expenditure	Without E deficit	Total E revenue	Total E expenditure			
2011-2012	114693	152420	-37727	101077	114463	-13386	13616	37957	-24341	64.518	
2012-2013	128128	174011	-45883	113710	123723	-10013	14418	50288	-35870	78.177	
2013-2014	140375	188205	-47830	125252	138005	-12753	15123	50200	-35077	73.336	
2014-2015	145966	204380	-58414	129057	156200	-27143	16909	48180	-31271	53.533	
2015-2016	172951	238435	-65484	152323	171366	-19043	20628	67069	-46441	70.919	
2016-2017	201210	269499	-68289	177486	206148	-28662	23724	63351	-39627	58.028	
2017-2018	216556	321862	-105306	193074	225925	-32851	23482	95937	-72455	68.804	
2018-2019	251879	391690	-139811	224452	281879	-57427	27427	109811	-82384	58.925	
2019-2020	265908	420160	-154252	239272	300467	-61195	26636	119693	-93057	60.328	
2020-2021	328665	460160	-131495	293758	346626	-52868	34907	113534	-78627	59.794	

Table A2.1. ANOVA test of deficit budget.

ANOVA						
Source of variation	SS	df	MS	F	P-value	F crit
Rows/ Regression	4.34	9	4.823	1.027	0.448	2.250
Columns/ Residual	8.69	3	2.896	61.722	3.28	2.960

Note: Independent variable deficit budget.

Table A3. Total environmental expenditure.

FY_year	Actual expenditure	Expenditure					BDT in crore		
		Fuel and energy	Transportation	Industrial	Agriculture	Environmental & forest	Disaster management	Total expenditure	% of E. expenditure
2011-2012	152420	7.969	9.455	1.579	13436	1.235	4.283	37.957	24.90
2012-2013	174011	10.280	12.480	2.603	18825	862	5.238	50.288	28.89
2013-2014	188205	10.504	14.244	2.433	16488	789	5.742	50.200	26.67
2014-2015	204380	5.894	19.046	2.557	15043	883	4.757	48.180	23.57
2015-2016	238435	16.375	24.104	1.929	16969	908	6.784	67.069	28.12
2016-2017	269499	14.620	22.899	2.199	15218	1.675	6.740	63.351	23.50
2017-2018	321862	28.562	40.076	2.425	18408	718	5.748	95.937	29.80
2018-2019	391690	37.188	37.833	3.265	22780	820	7.925	109.811	28.03
2019-2020	420160	33.132	53.743	3.083	21149	828	7.758	119.693	28.48
2020-2021	460160	22827	50230	5014	25759	901	8803	113.534	24.67

Table A3.1. t-Test, regression statistics test, coefficient & ANOVA test for environmental expenditure.

t-test: Two-sample assuming variances						
Test result	Total E. expenditure					
Mean	75602					
Hypothesized mean	0					
df	10					
t stat	5.692					
P(T<=t) one-tail	0.000					
t Critical one-tail	1.812					
P(T<=t) two-tail	0.000					
t Critical two-tail	2.228					
Summary output						
Regression statistics						
Multiple R	0.999					
R square	0.998					
Adjusted R square	0.994					
Description	Coefficients	Standard error	t stat	P-value		
Intercept	7267.191	35883.106	0.202	0.852		
Fuel and energy	3.489	0.798	4.367	0.022		
Transportation	3.136	0.502	6.244	0.008		
Industrial	49.989	12.207	4.094	0.026		
Agriculture	-6.443	3.893	-1.654	0.196		
E & F	33.669	14.241	2.364	0.099		
Disaster management.	11.157	4.893	2.280	0.106		
ANOVA						
	df	SS	MS	F	Significance F	
Regression	6	1.1	1.83	298.624	0.000	
Residual	3	1.84				
Total	9	1.1				
ANOVA: Test						
Source of variation	SS	df	MS	F	P-value	F crit
Rows	800800917	9	88977880	1.937	0.077	2.152
Columns	5481907543	4	1.37	29.837	5.51	2.633

Note: Independent variable environmental expenditure.

Table A4. Total environmental revenue assuming.

Revenue						Bangladeshi taka(BDT) in Crore		
Financial year (FY)	Actual revenue	Motor Ve. TAX	Land DEV. TAX	Fine penalty	Export duty	Import duty	Total E. revenue	% E. revenue
2011-2012	114693	676	494	396	67	11,983	13616	11.87
2012-2013	128128	813	517	457	0	12,631	14418	11.25
2013-2014	140375	966	693	338	0	13,126	15123	10.77
2014-2015	145966	1,063	675	275	3	14,893	16909	11.58
2015-2016	172951	1,627	827	348	30	17,796	20628	11.92
2016-2017	201210	1,472	853	614	22	20,763	23724	11.79
2017-2018	216556	1,480	1,384	601	31	19,986	23482	10.84
2018-2019	251879	1678	665	687	115	24,282	27427	10.88
2019-2020	265908	1568	667	603	77	23721	26636	10.02
2020-2021	328665	1504	917	893	1	31592	34907	10.62

Table A4.1. t-Test, regression statistics test, coefficient & ANOVA test for environmental revenue.

t-test: Two-sample assuming variances					
Test Result	Total E revenue				
Mean	21687				
Variance	47177362				
Observations	10				
Hypothesized mean difference	0				
df	9				
t stat	7.927				
P(T<=t) one-tail	1.189				
t Critical one-tail	1.833				
P(T<=t) two-tail	2.379				
t Critical two-tail	2.262				
Summary output					
Regression statistics					
Multiple R	0.991				
R Square	0.982				
Adjusted R square	0.959				
Observations	10				
ANOVA					
Description	Degree of freedom	Sum of squares	Multiple sclerosis	F	Significance F
Regression	5	42626457786	8.53	43.998	0.001
Residual	4	775055439.2			
Total	9	43401513225			
Description	Coefficients	Standard error	t stat	P-value	
Intercept	-13910.90	18369.05	-0.757	0.491	
Motor vehicle tax	-14.96	32.88	-0.454	0.672	
Land dev tax	15.76	26.92	0.585	0.589	
Fine penalty	-14.66	73.99	-0.198	0.852	
Export duty	104.23	158.38	0.658	0.546	
Import duty	11.62	2.98	3.888	0.017	

Note: Independent variable environmental revenue.

Table A5. Variance inflation factors (VIF) test result.

Details variables	Standardized coefficients	T	Sig.	Collinearity statistics	
	Beta			Tolerance	VIF
Fuel and energy expenses	0.35	4.367	0.022	0.087	11.516
Transportation & other expenses	0.453	6.244	0.008	0.106	9.458
Industrial expenses	0.429	4.095	0.026	0.051	19.732
Agriculture expenses	-0.224	-1.655	0.197	0.03	32.923
Environment and forest expenses	0.087	2.364	0.099	0.411	2.432
Disaster management and relief expenses	0.149	2.28	0.107	0.13	7.669
Motor vehicle tax	-0.078	-0.269	0.801	0.147	6.793
Land development tax	0.079	0.479	0.657	0.456	2.191
Fine penalty	-0.101	-0.296	0.782	0.107	9.363
Export duty	0.189	1.261	0.276	0.551	1.816
Import duty	1.039	2.309	0.082	0.061	16.378

Note: Dependent variable: Actual expenditure with independent variable environmental expenditure and revenue.

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