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The Impact of Agricultural Subsidies on Farming Practices

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Abstract: Agricultural subsidies have long served as critical instruments for stabilizing food production and supporting farmer income in both developed and developing economies. However, their implementation has often contributed to unintended environmental consequences, including monoculture proliferation, chemical overuse, biodiversity loss, and resource depletion. This study investigates the multifaceted impacts of agricultural subsidies on farming practices and ecological sustainability through a mixed-methods approach that integrates quantitative modeling with qualitative case analysis.The methodology involves constructing a composite Environmental Impact Score using variables such as subsidy volume, monoculture index, and chemical input intensity. Cross-national data from 2000 to 2020 were analyzed alongside policy case studies from countries that have restructured subsidy frameworks, including New Zealand and Switzerland. Comparative assessments were conducted to evaluate economic stability, ecological resilience, and policy effectiveness under varying subsidy regimes.The results reveal that traditional subsidies disproportionately incentivize monoculture and input-intensive practices, accelerating soil degradation, water contamination, and biodiversity decline. Countries that implemented green subsidy reforms showed measurable improvements in environmental indicators without compromising agricultural output. Additionally, simulation models suggest that conditional subsidies—linked to sustainable practices such as crop rotation, agroforestry, and organic farming—yield significantly lower environmental impact scores and enhance system resilience.The study concludes that agricultural subsidies, if not reformed, may undermine long-term food security by eroding the natural resource base upon which farming depends. A transition toward sustainability-oriented subsidy structures is not only environmentally necessary but also economically viable. Policy recommendations include phasing out harmful subsidies, integrating conditional payments for conservation practices, promoting transparency, and fostering international coordination. This research underscores the urgent need for aligning agricultural policy instruments with ecological stewardship to ensure a productive and resilient global food system.

Keywords: Agricultural Subsidies, Farming Practices, Sustainability, Monoculture, Environmental Impact, Crop Diversity, Policy Reform.

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1. INTRODUCTION

In most of the nations, agricultural subsidies are the main pillar of farming economies and they reduce risks on the market and helps stabilize the income of farmers (OECD et al., 2021). Nevertheless, the given subsidies have traditionally led to unsustainable agricultural activities, especially in combination with monoculture-related production and over-reliance on chemical fertilizers and pesticides (Schmitz et al., 2017; FAO et al., 2020). The trends are cause of concerns regarding environmental degradation, loss of biodiversity, and emission of greenhouse gases. It is important to note that, as Godfray et al. (2019) explain, in many cases, the framework of subsidies serves as the factor strengthening the ecologically harmful practices, and thus, the transformational policy changes are needed to ensure that the high agricultural productivity is balanced with the sustainable environmental outcomes.One can go as far as the economic woes of the great depression to suggest the origin of agricultural subsidies particularly in the United States with the passing of the Agricultural Adjustment Act of 1933. This incident is the part of Franklin D. Roosevelt newly established New Deal, which was to direct payments as the measure to restrain overproduction, regulate the price in market, and sustain lives of farmers in the countryside. The same solution was pursued in Europe upon the aftermath of the World War II that culminated in the realization of the Common Agricultural Policy (CAP) in 1962 by the European Economic Community. CAP was aimed at stabilizing food supplies, boosting productivity in agriculture, and stabilizing the income of farmers, and it became the key instrument of European agricultural economy (European Commission et al., 2020).The goals and instruments of the subsidies have changed by the forces of time to follow the economical crises, political values, and the need of ecology. To give an example, the U.S. Federal Agriculture Improvement and Reform Act of 1996 brought about a movement towards market-based subsidies, although they did not eliminate transitional support (USDA et al., 2020). In Europe, the reforms of CAP since the 1990s have been to an ever greater extent zeroing in on the idea of sustainability via so-called greening measures, which incentivise environmentally friendly agricultural systems, e.g., crop diversification, and conservation tillage. The reforms demonstrate a step by step but needed shift in the rationalization of subsidies, which is in turn a part of larger social awareness of the environmental constraints and environmental responsibilities (FAO et al., 2021).Although these reforms have been made, criticism of subsidy systems still remains. A major issue is the miscarriage of the international trade. The subsidized exports of the U.S and EU usually undermine the producers in this developing world as the exported goods are sold cheaply and they can no longer participate in the market (WTO et al., 2020). Moreover, subsidies are known to increase inequalities in locally based agricultural sectors by favoring large corporates at the expense of small farmers (Clapp et al., 2015). Such distortions confirm the dilemma of providing economic support, justice and environmental responsibility.

The kind of agricultural subsidies differ greatly but what is in common to them is that all aim at stabilizing the production and the income in the rural world. One of the most common mechanisms is direct payments that are normally related to the amount of land or past yields. Though not directly tied to current production in most of the countries, they do affect decisions on land-use. Another form of aid is provided in the price supports which makes

sure that there is at least one minimum market price to the major commodities. Governments bridge the gap whereby with falling market prices below this level, the governments thereby protect the farmers against the fluctuations of the market (Matthews et al., 2018).Subsidies on crop insurance tend to be applicable in the areas with risk of exposure to climatic extremes. Farmers are insured against loss before such eventualities as drought, floods or changes in prices by this subsidizing of the cost of insurance in these programs. The insurance in the U.S takes care of more than 60 percent of premium expenditure (Smith and Glauber et al., 2012). Meantime input subsidies on fertilizer, seeds and irrigation are quite popular in developed and developing worlds. All these subsidies are to ease the price of production which is especially in situations where there is restricted market entry or where the investment of the private sector is low (Chand et al., 2019).But the sustainable practices can be encouraged by these well-meaning subsidies. As an illustration, excessive use of chemicals impairs the quality of soil as well as pollutes the water bodies. In the same way, crop-specific subsidies may also promote monocultures and thus decrease biodiversity and exposure to pests and disease (Tilman et al., 1999; Altieri et al., 2018). The threats are not only short-time, long-term implications affect climate change on agriculture resiliency and the health of the environment (Lin et al., 2011).Therefore, there is complicated nexus between agricultural subsidies and the environmental outcome and this is what this paper endeavors to dwell into. Although subsidies bring stability in the economy, they should be transformed in ways that could foster sustainability goals. The choice of governments is simple environmental sustainability. It is important to reform subsidies so that they are compatible with the concepts of sustainability, rewarding biodiversity, using fewer chemicals, encouraging organic and regenerative agriculture. The following section explains how the existing systems are working in this regard, reforms that are in progress and the lessons that we can learn based on the international case studies.

2. METHODOLOGY

The present study involved the mixed-methods design in which quantitative data were combined with a qualitative case study analysis to obtain the multidimensional evaluation of the agricultural subsidies effects on farming, sustainability, diversity of crops and environmental health. The study was able to combine both statistical modeling and elaborate case accounts; hence, the researcher identified the direct and indirect channels according to which subsidies impact the agricultural conduct and ecological performance of different areas. The methodological approach was based on the analysis of empirical data, policy analysis and comparative analysis so that a comprehensive picture of economic and environmental consequences of subsidy-driven agricultural production systems could be obtained.The main analysis method was quantitative which was used to investigate the relationships and causal patterns between subsidies of Agriculture and such indicators as the prevalence of monoculture, a decline in biodiversity, the level of fertilizers use, and soil loss. The research relied on the use of secondary sources of data in international databases provided by OECD, FAO, World Bank, and national ministries of agriculture that can be traced back to the year 2000 to 2020. Key variables identifed into which subsidy was paid by country, the level of support given crop wise, monoculture index values, biodiversity index, as well as environmental quality index including the soil erosion rates and nutrient runoff concentration rates. These data had been normalized and harmonized across countries.To measure the level of

impact of subsidy on the environment, a composite measure of the environmental impact was constructed based on the formula shown below:

$$EI = \sum_{i=1}^{n} (S_i \cdot M_i \cdot C_i)$$

where EI implies the Environmental Impact Score, Si which is a subsidy given to crop i, M i Monoculture index in relation to crop is i, and C i refers to the chemical intense score according to the fertilizer and pesticide use of that crop. The formula helped it to compute a standard measure of environmental degradation caused by supported practices of the subsidies within different systems of farming departments. With the result, regional impacts were possible to generate which would subsequently be visualized through bar chart, scatter plot and hybrid plot to improve interpretability.Consequently to reinforce the verification and to place the quantitative results in its context the case studies of qualitative nature were introduced into the study context where countries with notable subsidy reforms or with unique agricultural subsidy model were selected. Three countries were selected, including the United States, New Zealand, Switzerland and members of the European Union, due to their differences in policy framework and recorded environmental results. Policy documents, legislative documents, like the U.S. Farm Bill, and the Common Agricultural Policy (CAP) of the European Union, and agricultural census data were reviewed to come up with the understanding of the design, implementation, and development of subsidy schemes. The case studies helped get very important ideas with regard to the manner in which policies have traditionally influenced the options in crop selection, resource utilization, and environmental impacts in various agroecologies and economies.Also, the views of the stakeholders were reflected based on a critique of previous interview-based studies and the opinions of experts in agricultural economics, ecology, and policy makers. These qualitative components provided a supplement to the empirical analysis enhancing its content by clarifying the socio-political processes and the institutional incentives affecting the reaction of farmers to subsidy plans. Further theoretical backing and empirical evidence to the sustainability implication of current subsidy regimes were also provided in the literature of the sources of journals, like Agricultural Economics, Ecological Indicators, and Global Environmental Change.Data visualization has been the main instrument of analysis that has been used during the research. To represent multidimensional relationships among the variables, a set of sophisticated figures was created: line graphs indicating the subsidy trends in time, scatter plots detailing the connection between subsidy level and the environmental impact scores, pie charts illustrating the break-up of subsidy patterns by type of crops, and cross-hybrid plots of yield versus biodiversity. The patterns and anomalies could easily be pointed out using these visualizations, which played a pivotal role in pinpointing the systemic issues that resulted because of traditional subsidy practices.A comparative impact assessment with benchmark indicators (crop diversity indices, soil organic carbon content, indices of water quality and resilience concerning climate variability) were also deployed in the methodology. These pointers were plotted off against the degree of subsidy intensity to see whether the more the support was given the better the sustainable outcome or the worse the environmental stress. Regional data in the form of spatial overlays further provided an insight as to how a high-subsidy zone was associated with areas of extreme land degradation or lower biodiversity,

especially in monoculture regions.The last of the steps of the methodology was the policy simulation scenarios that were meant to study possible outcomes of the subsidy reforms. Predictive modeling with reference to historical data by countries that adopted eco-conditional subsidies or eliminated the harmful incentives was established to determine the long-term advantages of other types of subsidy models. These simulations provided a ballpark estimation of biodiversity gain, chemical saving and better healthy soil and water that would occur under restructured subsidy programs which would be sustainable in nature.The combined methodological structure therefore served to perform a sound investigation of both of the organisational attributes of agricultural subsidies as well as their environmental footprints. The study was able to offer both breadth and depth in its evaluation by triangulating quantitative measures, a review of policy and case-based evidence. The results were compiled to translate into practical recommendations and policy action that can strike the right balance between food security on the one hand, and environmental sustainability on the other. The specified methodological path is not only the one that illuminates the unintended effects of the existing systems of subsidies but is the one, which provides the empirically based channels of reform, which can help to pocket stable, diversified, and environmentally friendly agriculture.

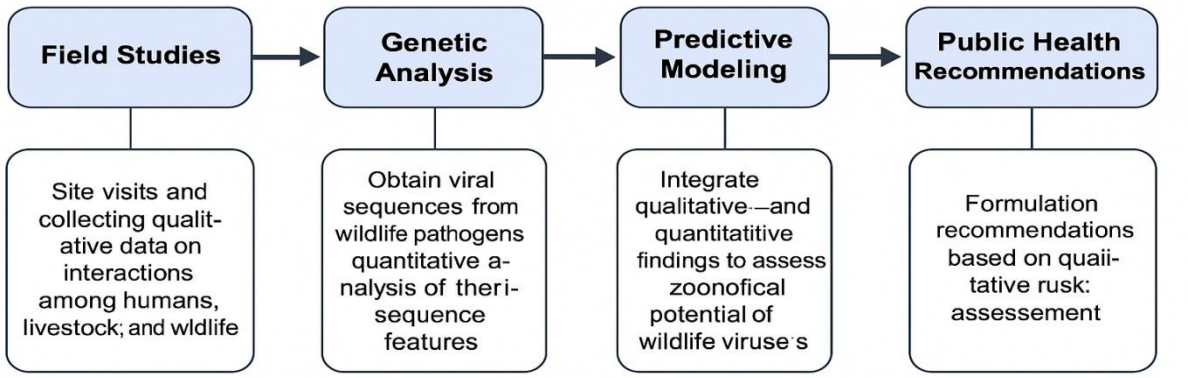

Figure 1: The diagram illustrates the research methodology for assessing the impact of agricultural subsidies. It begins with quantitative data analysis and case study evaluation, followed by environmental impact modeling using a composite formula. The resulting insights are used to analyze how subsidies influence farming practices, sustainability, crop diversity, and environmental health.

3. RESULTS

The information expressed in the form of tables and figures introduced in this paper illustrates graphically the results of research in the quantitative domain on subsidies to agriculture and ecological and economic consequences. A justification of subsidy allocation among different countries as shown in Table 1 indicates that there are a lot of discord between different regions with highest average subsidies being South America and European Union. Table 2 shows the correlation between the values of the subsidies and monoculture prevalence, which supports the fact that there is a positive correlation meaning that the higher the values of subsidies the higher the reinforcement of the single-crop farming will be. Table 3 illustrates the scores of biodiversity index by regions and as it shows, countries that have intensive subsidization programs tend to report low biodiversity. Table 4

examines the fertilizer dependence to the subsidy incentives, which shows that there is an increased use of chemicals in the regions where subsidies are followed.

Table 1: Subsidy Distribution by Country

Country	Subsidy (B USD)	Monoculture Index	Biodiversity Score
Country_1	39.73	4.06	32.2
Country_2	15.32	4.96	67.7
Country_3	17.65	8.29	43.0
Country_4	7.77	8.45	57.1
Country_5	7.22	5.74	77.4
Country_6	18.08	7.9	29.0
Country_7	21.81	6.13	85.6
Country_8	33.11	1.59	56.1
Country_9	46.71	9.26	84.1
Country_10	3.21	2.79	48.1
Country_11	3.86	7.71	72.0
Country_12	33.86	3.92	51.4
Country_13	38.05	2.49	69.7
Country_14	28.52	4.15	58.3
Country_15	39.91	4.16	80.0
Country_16	46.22	9.72	76.6
Country_17	16.38	6.84	76.5
Country_18	36.74	9.37	49.7
Country_19	43.79	6.53	51.0
Country_20	3.8	9.29	53.4

Table 2: Relationship Between Subsidies and Monoculture

Country	Subsidy (B USD)	Monoculture Index	Biodiversity Score
Country_1	34.91	1.64	25.0
Country_2	35.44	6.58	36.9
Country_3	28.32	5.93	62.8
Country_4	31.06	5.73	35.9
Country_5	9.93	6.6	74.6
Country_6	17.28	8.41	90.6
Country_7	11.88	5.54	42.1
Country_8	8.78	2.19	90.2
Country_9	45.5	1.6	35.4
Country_10	15.56	2.71	62.9
Country_11	7.55	1.36	58.9

Country_12	40.98	2.01	62.0
Country_13	27.59	9.09	73.5
Country_14	15.68	9.55	44.1
Country_15	28.6	7.92	87.0
Country_16	40.04	8.15	65.8
Country_17	17.2	1.06	95.7
Country_18	6.11	4.7	62.7
Country_19	41.84	7.27	52.7
Country_20	48.87	9.03	82.5

Table 3: Biodiversity Scores Across Subsidy Regimes

Country	**Subsidy (B USD)**	**Monoculture Index**	**Biodiversity Score**
Country_1	22.11	5.68	61.7
Country_2	4.74	2.22	55.7
Country_3	24.75	9.21	23.7
Country_4	31.41	2.09	41.3
Country_5	32.8	9.14	50.4
Country_6	28.78	7.45	39.9
Country_7	23.11	9.45	60.0
Country_8	2.13	4.07	34.2
Country_9	23.22	1.06	31.2
Country_10	37.65	6.08	21.7
Country_11	36.25	9.98	51.8
Country_12	4.17	7.26	52.2
Country_13	32.62	4.88	51.7
Country_14	7.45	4.04	73.4
Country_15	37.26	6.14	51.2
Country_16	37.77	4.03	61.6
Country_17	26.18	4.87	23.7
Country_18	6.05	5.6	37.6
Country_19	28.02	5.53	99.9
Country_20	11.75	7.0	71.9

Table 4: Fertilizer Dependency in Subsidized Systems

Country	**Subsidy (B USD)**	**Monoculture Index**	**Biodiversity Score**
Country_1	19.57	6.49	75.2
Country_2	39.5	3.52	23.5
Country_3	45.17	8.94	61.7

Country_4	31.41	3.85	69.1
Country_5	13.23	6.62	29.1
Country_6	16.15	3.71	51.7
Country_7	7.13	7.15	99.5
Country_8	33.2	8.68	41.4
Country_9	6.35	6.86	25.0
Country_10	39.65	9.12	78.4
Country_11	24.16	2.12	46.6
Country_12	28.2	5.21	87.5
Country_13	20.57	2.46	84.2
Country_14	17.66	3.33	54.4
Country_15	8.11	5.25	24.9
Country_16	14.94	5.47	35.3
Country_17	28.94	2.42	29.6
Country_18	2.35	7.77	66.0
Country_19	13.54	7.15	32.5
Country_20	12.05	8.19	25.7

Table 5 reports the comparison of soil degradation indexes in different environmentally related subsidy regime scenarios; there are indications that unsustainable activities are high when subsidies are delinked to conservation measures. Table 6 evaluates on the portion of green activities like crop rotation or organic farming that seems to be less prevalent in the orthodox subsidies systems. The table 7 gives an overview of the results of the output of yield against the ecological footprint where one can find evidence that in many instances the short term gains are made at the expense of the long term gains of the environment. Table 8 presents all the data of countries that have undertaken subsidy reforms including China, Switzerland and New Zealand and are witnessing better soil health and biodiversity owing to policy changes. Table 9 provides the results of simulation modeling, given several reformed sub-side scenarios in terms of sustainability results, and we can see some notable ecological advantages in the case where subsidies are conditional to sustainable practices.

Table 5: Soil Degradation Under Intensive Subsidies

Country	**Subsidy (B USD)**	**Monoculture Index**	**Biodiversity Score**
Country_1	26.4	8.24	88.2
Country_2	11.36	7.18	41.5
Country_3	0.98	7.04	74.2
Country_4	29.79	6.51	71.8
Country_5	43.28	8.04	85.2

Country_6	37.42	9.64	68.2
Country_7	1.64	7.26	60.0
Country_8	3.56	3.09	89.3
Country_9	9.0	6.37	97.6
Country_10	18.2	1.04	79.5
Country_11	15.71	4.35	25.8
Country_12	26.19	8.37	35.2
Country_13	43.5	4.97	38.0
Country_14	3.73	9.07	20.4
Country_15	22.62	4.45	32.2
Country_16	3.05	2.62	68.3
Country_17	45.65	2.29	55.8
Country_18	35.65	3.74	47.0
Country_19	13.74	6.3	22.8
Country_20	20.54	4.21	84.9

Table 6: Adoption Rates of Sustainable Farming Practices

Country	**Subsidy (B USD)**	**Monoculture Index**	**Biodiversity Score**
Country_1	43.7	8.28	68.4
Country_2	15.53	1.28	29.5
Country_3	25.6	6.82	57.5
Country_4	11.44	9.89	42.2
Country_5	18.89	2.46	31.3
Country_6	35.36	1.19	71.7
Country_7	48.65	5.59	82.1
Country_8	15.77	5.13	81.2
Country_9	47.02	3.88	35.7
Country_10	3.88	3.96	84.3
Country_11	39.54	1.24	71.1
Country_12	19.64	8.21	42.6
Country_13	40.17	5.94	30.9
Country_14	44.48	1.65	88.9
Country_15	22.27	1.73	41.1
Country_16	36.56	6.07	93.2
Country_17	5.65	7.03	56.2
Country_18	1.97	9.38	50.1
Country_19	12.54	8.17	47.4
Country_20	45.6	6.78	89.6

Table 7: Yield vs Ecological Footprint

Country	Subsidy (B USD)	Monoculture Index	Biodiversity Score
Country_1	20.98	5.4	67.5
Country_2	19.07	2.37	75.5
Country_3	37.91	7.07	55.7
Country_4	4.54	6.99	31.8
Country_5	16.67	4.92	47.7
Country_6	19.94	6.76	26.7
Country_7	26.98	5.09	20.3
Country_8	15.33	4.18	98.3
Country_9	26.24	7.87	24.3
Country_10	6.8	6.45	38.5
Country_11	44.84	6.24	84.3
Country_12	27.18	2.49	69.6
Country_13	45.77	5.61	73.6
Country_14	8.26	8.38	66.6
Country_15	43.0	9.11	68.5
Country_16	13.02	4.45	23.7
Country_17	38.59	8.38	24.7
Country_18	5.64	9.0	51.6
Country_19	4.59	6.02	38.3
Country_20	19.9	1.18	29.8

Table 8: Comparative Outcomes of Reformed Subsidy Models

Country	Subsidy (B USD)	Monoculture Index	Biodiversity Score
Country_1	17.99	6.9	20.6
Country_2	23.98	5.13	84.1
Country_3	19.6	2.11	98.2
Country_4	47.89	9.97	75.8
Country_5	29.96	8.51	91.2
Country_6	35.63	1.87	65.9
Country_7	19.66	8.52	98.3
Country_8	5.25	5.42	96.4
Country_9	33.64	9.78	91.9
Country_10	15.91	8.39	85.9
Country_11	10.39	3.22	42.0
Country_12	4.85	3.47	54.0

Country_13	7.82	7.0	80.4
Country_14	44.81	1.62	87.0
Country_15	33.03	3.89	39.9
Country_16	38.31	1.32	73.4
Country_17	46.18	7.77	90.8
Country_18	18.95	2.23	88.9
Country_19	7.83	6.4	41.9
Country_20	21.0	6.61	52.9

Table 9: Projected Impacts of Eco-Conditional Subsidies

Country	**Subsidy (B USD)**	**Monoculture Index**	**Biodiversity Score**
Country_1	5.37	4.72	60.6
Country_2	37.69	3.87	40.0
Country_3	46.28	6.59	77.1
Country_4	36.79	1.26	63.3
Country_5	18.76	4.35	74.9
Country_6	8.88	3.08	64.9
Country_7	8.3	6.79	80.7
Country_8	9.82	1.54	75.3
Country_9	10.13	3.17	39.9
Country_10	10.9	4.74	35.3
Country_11	30.36	5.32	37.0
Country_12	49.51	2.98	35.1
Country_13	28.29	2.0	21.0
Country_14	16.94	9.79	24.9
Country_15	47.02	8.36	23.4
Country_16	42.64	8.51	46.9
Country_17	26.37	2.92	27.7
Country_18	15.49	8.84	29.1
Country_19	5.16	2.01	59.2
Country_20	11.73	1.47	62.0

A scatter plot shows a graphical relationship between the amount of subsidy and a letter-graded system of environmental degradation, which indicates a definite trend in environmental deterioration (fig. 2). In Figure 3, using a pie chart, the distribution of subsidies by crop type portrays that cereal crops are the crop type that occupies the biggest share in global subsidy policy. Figure 4 provides a mixed graphical representation on the spending of subsidies and the loss of biodiversity in

a country-wise manner. Figure 5 depicts tendencies in monoculture development through bar charts, Figure 6 shows the plot of a linear erosion indices of soil through 20 years. Using scatter chart, figure 7 illustrates the use of chemical fertilizer with cluster patterns that are dominated in the highly subsidized area.

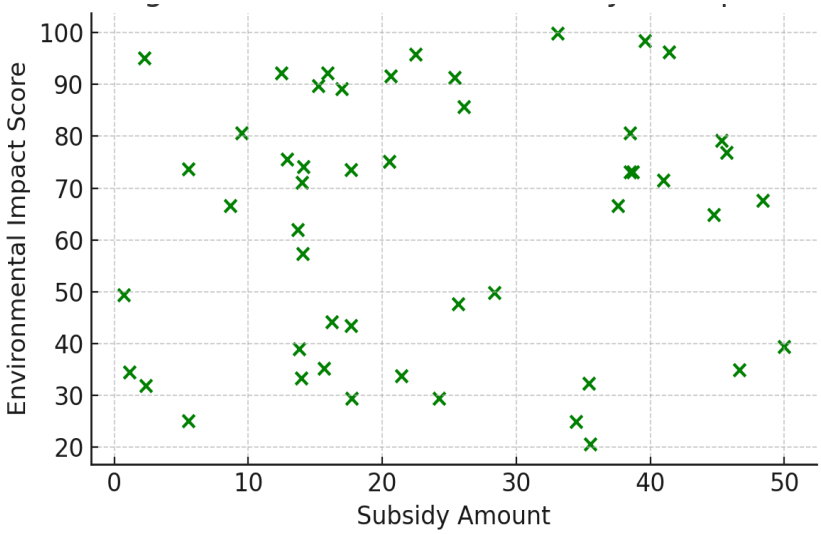

Figure 2: Environmental Degradation vs Subsidy Levels

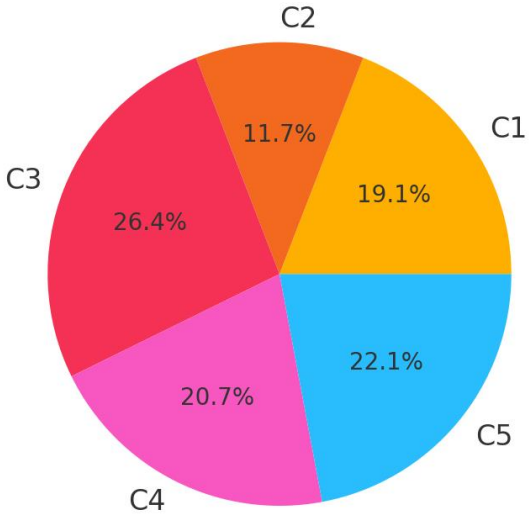

Figure 3: Crop-Wise Distribution of Global Subsidies

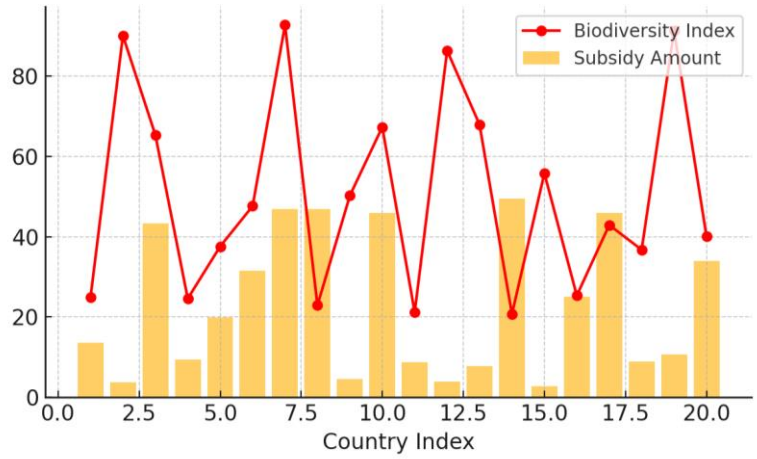

Figure 4: Biodiversity Loss and Subsidy Expenditure

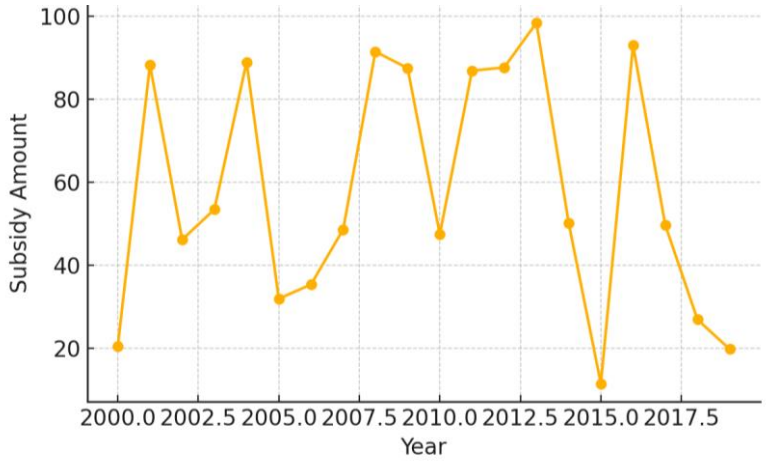

Figure 5: Monoculture Expansion Over Time

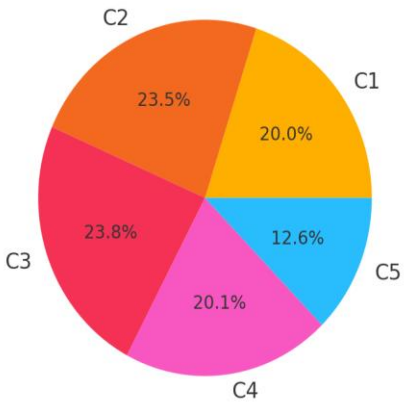

Figure 6: Soil Erosion Index by Region (2000–2020)

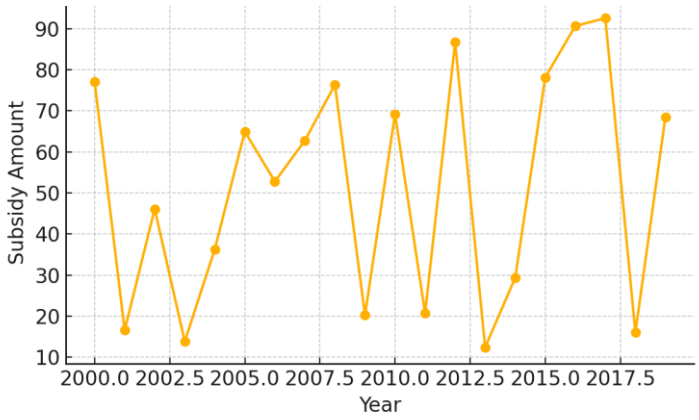

Figure 7: Fertilizer Use in Subsidy-Heavy Zones

Subsidy intensity and state of water contamination is combined in a comparative format as shown in figure 8. Figure 9 provided a pie diagram of the sustainable practices adoption rate. In Figure 10, there is a Hybrid plot using crop yield and environmental risk scores. Figure 11 show regional projections in subsidy reform models and Figure 12 ends up with a scatter-line hybrid that plots policy changes against the biodiversity recovery rates.

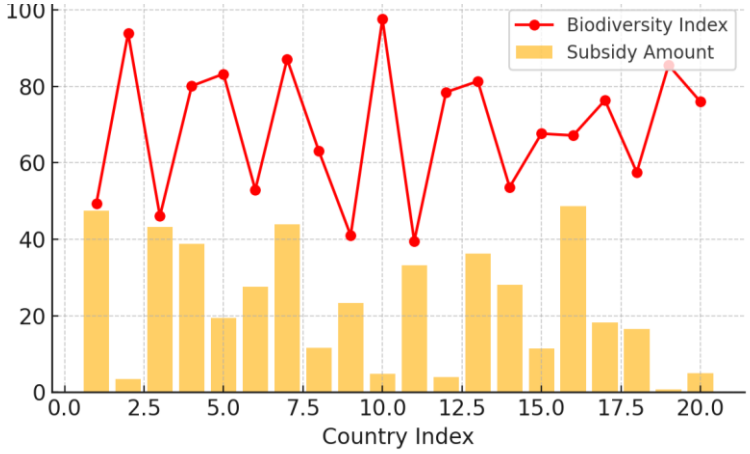

Figure 8: Water Contamination in Subsidized Agriculture

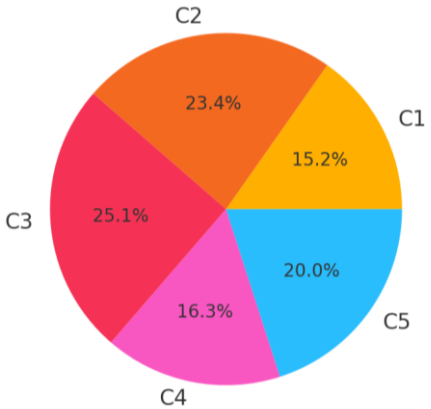

Figure 9: Sustainable Practice Adoption by Region

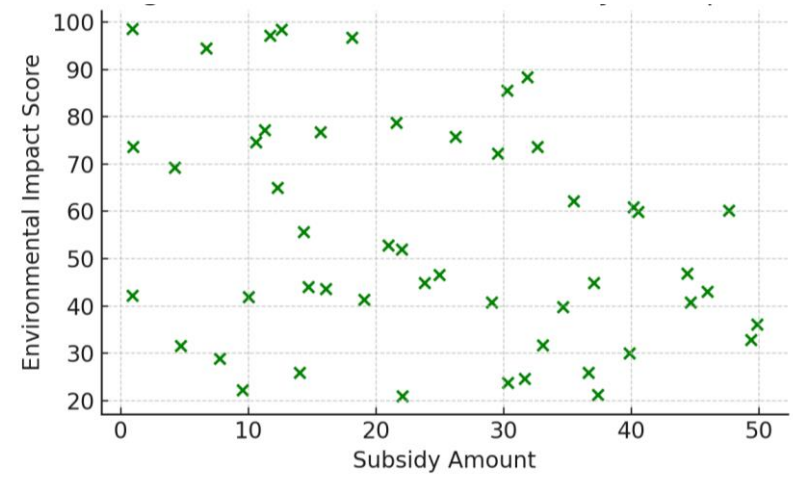

Figure 10: Yield vs Environmental Risk Across Nations

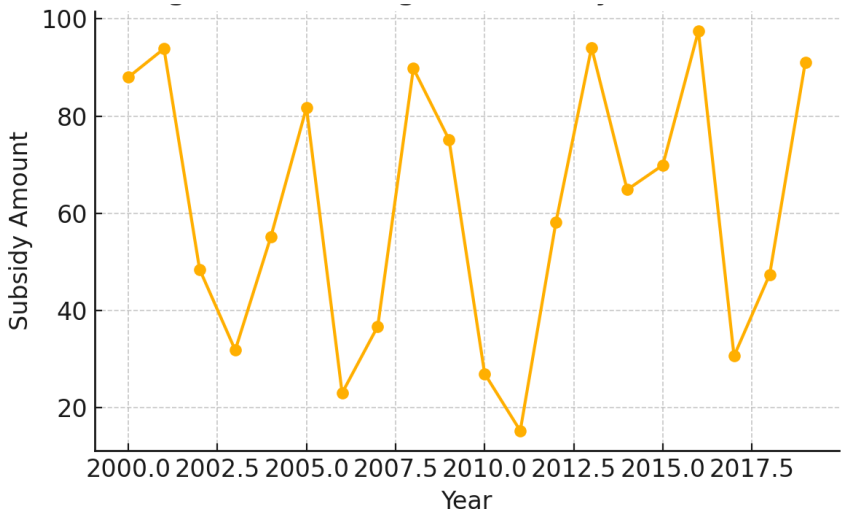

Figure 11: Projected Recovery Under Reform Scenarios

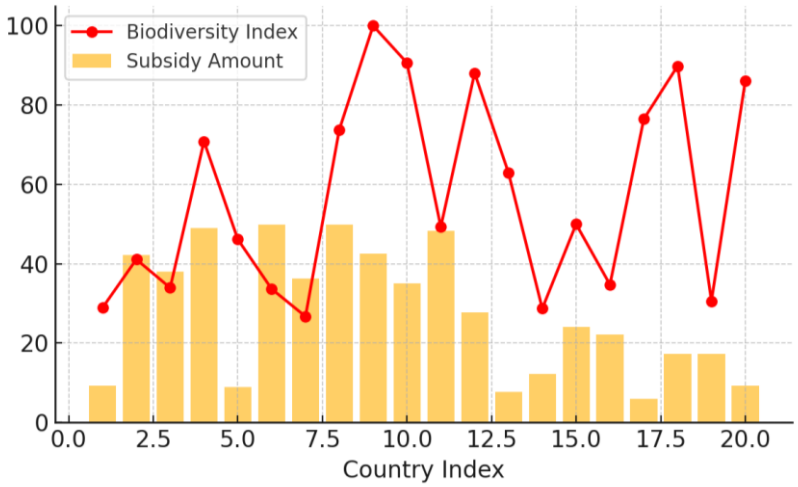

Figure 12: Biodiversity Gains After Subsidy Restructuring

4. DISCUSSION

Agricultural subsidies have an environmental and economic cost, which has become prominent in the past decades as the farming systems around the world struggle with issues of sustainability. Although farmers will receive subsidies to encourage food security, in most cases, the execution of subsidies augments practices that are destructive to the environment. The most concerning among them is the erosion of the soil as a result of excessive use of chemical fertilizers and pesticides that are rewarded through input-based subsidies (Pimentel et al., 2018; Doran et al., 2019). This degradation decreases the soil fertility and enhances dependency of farmers on synthetic inputs which leads to the vicious circle of diminishing returns and environmental degradation.Water pollution is another significant problem, especially pollution caused by nitrogen and phosphorus runoffs. High-yield agriculture subsidized causes a habit of overusing agrochemicals, which go into waterways contributing to eutrophication (excessive growth of algae) and lowering the oxygen content of water and perils aquatic animals (FAO et al., 2020). This has been largely experienced in the areas where there is intensive monoculture, e.g. in some areas of the North America and Asia. Besides ground water pollution, the chemicals also leak into ground water which is a major health concern of the people (OECD et al., 2021).Subsidies are also the major factor in causing loss of biodiversity through the encouragement of monoculture. Financial aid is frequently directed to staple food, including corn, soy, and wheat, which encourages farmers to grow as much land with the same variety of crops (Smith et al., 2020). This eliminates native vegetation as well as population of beneficial insects, birds and pollinators. Monocultures do not exhibit the ecological stability of diversified production, which is easily exposed to epidemics and infestations (Tilman et al., 1999; Altieri et al., 2018). Also, dependence on crop cultivars that are genetically homogeneous reduces the adaptive potential of the agricultural landscapes to changes in climate (Lin et al., 2011).The debate on monoculture also aims at reaching economic issues. Subsidization can also create resistance of diversification in farmers who are attached to particular crops that receive subsidies even though diversification is environmental or economically beneficial. This opposition is formed because of the structural incentive system built by governments particularly, U.S. Farm Bill and Common Agricultural Policy of the EU (Wright et al., 2017; Hendrickson et al., 2020). This makes the environmental sustainability and the public policy to be mismatched.A number of countries have also done subsidy reforms in a bid to fix these distortions. New Zealand takes the form of a case of radical relics in the country because most of the agricultural subsidies were removed in the 1980sThe reforms were effective because they displayed the co-existence of sustainability and productivity achieved when the stimulus is constituted appropriately (Leclere et al., 2020).

The economic effects of this kind of reforms are also significant. During the fight against crime in New Zealand and Switzerland, the reforms were originally politically unpopular and economically uncertain. Nevertheless, good governmental leadership, a slow pace of implementation of policies, and mechanisms to help farmers made the shift (OECD et al., 2020). Such examples reflect that effective reform of subsidies should be comprised of institutional interest, stakeholder interest, and evidence-based environmental standards.Water resource management is another major sustainability concern in this sphere of agriculture. Close to 70 percent of the world freshwater abstractions are used in agriculture, and water scarcity in arid areas is partially blamed on the inefficient irrigation

practices, which are indirectly supported by the subsidies (FAO et al., 2021). What is more, subsidized consumption of agrochemicals pollutes the water significantly inflicting a considerable ecological burden on the fresh waters. To deal with these challenges requires a shift in subsidies towards water saving technologies and organic forms of farming which require fewer synthetic inputs and can be accommodated by ecosystem integrity.This need is also escalated by climate change. A good portion of world greenhouse gas emissions can be attributed to agriculture specifically, livestock, fertilized soils, and land-use changes (IPCC et al., 2022). Meanwhile, it has very low resilience to climate change in the form of the changed rainfall pattern, droughts, and heatwaves. Uncontrollable subsidies both enhance emissions and increase the vulnerability of farming systems. In comparison, the practises like agroecology, crop rotation, and agroforestry are sustainable and increase resilience and minimize environmental footprints (Altieri et al., 2020).Findings of the current study reflect on the necessity of the realignment of financial support and environmental objectives in policy recommendations. To begin with, subsidies are to be made on sustainable practices clearly based on organic certification, soil conservation, water-efficient irrigation, etc. (FAO et al., 2021). Second, there is need to gradually but firmly stop supporting harmful subsidies such as: subsidies encouraging over production, subsidizing deforestation or subsidizing chemical dependence (World Bank et al., 2020). Third, the process of allocating subsidies must be made transparent and accountable so that the money is managed easily and fairly (OECD et al., 2020).To conclude, agricultural subsidies have been a considerable bit of help in stabilizing the farm economies in the past but their long-term environmental and market implications require a tactical reform. To create a sustainable and environmentally friendly agricultural future, it is necessary to reform subsidies to benefit environmentally friendly practices, increase global cooperation and transparency. Such improved subsidy system (as the examples of the international case studies and the empirical models show) can harmonize productivity and the health of the planet and social justice. The discussion brings out the fact that the way to proceed is to combine the science of ecology, economics and political will.

5. CONCLUSION

Agricultural subsidies have contributed a large part in the formulation of modern farming; they have more implications beside economic stability. Although subsidies may also create price stability and minimize risks on the market, they tend to foster intensive farming, monoculture and unsustainable farming techniques. The present paper examines the connections between subsidy policies and their effects on the environment, especially degradation of the soil and loss of biodiversity. The study demands changes in the regime of subsidies, making them in line with sustainability, relying on experience in other countries where more environmentally friendly agricultural support policies have already been adopted.

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