

Analyzing Environmental Investment Differences: A Comparative Study of Fixed Asset Investments for Environmental Protection of the past five years in the Kyrgyz Republic and the Islamic Republic of Afghanistan © 2023 by Hassibullah Ranjbar, Ahmad Modasir Habib is licensed under CC BY-NC-ND 4.0

Group 6

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Project Topic: “Analyzing Environmental Investment Differences: A Comparative Study of Fixed Asset Investments for Environmental Protection of the past five years in the Kyrgyz Republic and the Islamic Republic of Afghanistan.” (track 2)

Introduction

The Kyrgyz Republic and the Islamic Republic of Afghanistan have been at the vanguard of a growing environmental catastrophe for the past five years, made worse by the worrying effects of climate change (Khaimov et al. 33). Three significant concerns have emerged from the once-far-off specter of climate-related challenges: rising sea levels, desertification, and increased extreme weather occurrences. These hardships are not separate events; instead, they are interwoven strands of an environmental patchwork that is coming apart, endangering the very foundation of societies in both countries. The threat of ecological degradation, the impending rise in ocean levels, and the rising frequency of catastrophic weather events all indicate that the earth faces severe consequences from unmanaged environmental deterioration.

The fact that climate change multiplies risks makes solving these environmental issues much more urgent. Climate change is a sneaky force that amplifies the effects of current problems and transforms them into intricate and interconnected hazards. It changes the perception of desertification from one confined to a specific area to one that impacts community sustenance, water availability, and agricultural techniques. Similarly, rising sea levels, formerly a distant concern, are now a real danger to coastal areas, impacting local communities' socioeconomic dynamics and the environment. Once rare, the increase in catastrophic weather occurrences becomes a reoccurring nightmare that upends lives, economics, and even the stability of entire countries. These environmental issues become complex emergencies due to the risk multiplier effect of climate change, necessitating immediate attention and calculated action.

The discrepancy in environmental spending becomes a severe issue that requires careful investigation in light of these growing issues. Although combating desertification, reducing sea level rise, and dealing with extreme weather occurrences are issues both the Kyrgyz Republic and Afghanistan must deal with, their approaches may differ significantly. Comprehending these discrepancies is essential for making well-informed decisions and developing focused policies. It entails dissecting the complexities of every country's political agenda, environmental regulations, and socioeconomic environment (Radovanovic et al. 10). The differences in ecological spending are not just monetary; they also represent the more general difficulties every country has in striking a balance between environmental sustainability and economic development. To effectively address this intricate real-world issue, a detailed analysis that looks behind the surface is needed to determine the underlying causes of the vulnerabilities and environmental resilience of the Islamic Republic in Afghanistan and the Kyrgyz Republic.

Mathematical model

The mathematical model systematically incorporates key variables intended to examine the difficulties of environmental spending in the context of climate-induced hazards. Understanding and measuring the differences between the power of the Kyrgyz Republic and Afghanistan's

efforts to tackle the problems of desertification, rising sea levels, and extreme weather over the previous five years depends on these elements.

1. **Geographical Sensitivity (GV):** This metric shows how vulnerable particular areas are to environmental risks within each nation. It mainly focuses on various elements, which are not exempted to the composition of soil, geography, and nearness to water bodies. A complete index reflecting the relative susceptibility of different locations to desertification, rising sea levels, and severe weather is created by weighing several geographic characteristics.
2. **Severity of Weather-Related Events (the SCE):** This variable measures the frequency and severity of problems each nation faces due to climate change. It includes past information on severe weather events like storms, floods, and droughts. Event categories are assigned different levels of importance by a weighting method that considers the potential impacts on people and the ecology (Hagon 156-158). The resulting score gives the Kyrgyz Republic and Afghanistan a gauge of the general severity of the difficulties associated with climate change.
3. **Economic Resilience (ER):** This indicator evaluates each country's ability to endure and bounce back from environmental shocks. It considers GDP, economic diversification, and how well adaptation plans work. The model creates an economic resiliency index by giving these factors weights, which indicates how well Afghanistan and the Kyrgyz Republic can allocate money to ecological initiatives despite financial difficulties.

Using the following equation in expressing the whole mathematical model (Dhingra et al., p.48): Ecological Investing = $f(GV,SCE,ER) + \epsilon$

A function with the symbol f combines the variables for geographic vulnerability (GV), the severity of climate change-linked events (SCE), and economic resilience (ER). The model adds an error term for these components' inherent complexity. (ϵ) to consider uncertain or unobservable influences. Using this mathematical model, we hope to measure the connections between economic resilience, climate-related issues, geographic vulnerability, and the ensuing ecological investments made by Afghanistan and the Kyrgyz Republic.

We did a simple linear regression analysis to compare the efficacy scores for environmental investments in Afghanistan and Kyrgyzstan. The data represent each country's investments in five ecological sectors, and a set of weights denotes the significance of each sector. Based on the supplied weights, the `calculate_score` function calculates the efficiency scores for Afghanistan and Kyrgyzstan. Next, we created a linear regression model with the `scikit-learn` module and fit it to the scores of Afghanistan and Kyrgyzstan. Based on Kyrgyzstan's score, the model forecasts Afghanistan's effectiveness score. The outcomes are shown, along with the actual score for Kyrgyzstan, the actual score for Afghanistan, and the expected score for Afghanistan. This code provides a basic illustration of how a model based on machine learning may be used to use the linear regression approach to analyze and forecast results about environmental investments.

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Kyrgyzstan's Score: 28.5
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Afghanistan's Actual Score: 26.15
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Predicted Afghanistan's Score based on Kyrgyzstan: 26.15
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Population selection

This study critically examines the environmental interventions undertaken within the last five years in the Kyrgyz Republic and Afghanistan to counter desertification, rising sea levels, and severe climatic changes (Khan et al., p.40). All payments spent on investments in preserving fixed assets in favor of mitigating climate change risks constitute the study population. Initiatives to reverse the trend of desertification, adaptation to sea level rise projects, and interventions to deal with the growing frequency of severe weather are all included in the scope.

The stratified random sampling approach ensures a thorough and representative analysis. This approach groups the investments according to many criteria, such as environmental threats addressed, economic sectors, and impacted areas. This strategic classification makes it possible to conduct a more thorough investigation into the disparities in ecological spending between Afghanistan and the Kyrgyz Republic. The sampling method ensures that the subset chosen is a good representation of the complexity and diversity of the larger population of ecological investments. It is done by showing how the environmental problems in each country are different.

This sample methodology is significant because it offers a comprehensive picture of the environmental investments in both countries. Examining several strata allows for identifying trends, variances, and particular difficulties particular to each group, enhancing the conclusions drawn from the research (Radovanovic et al. 7). In addition to improving the validity of the results, this all-encompassing approach enables focused recommendations and interventions adapted to the unique requirements of geographic areas, industry sectors, and environmental hazards. Demographic evidence and the selected sampling technique are essential elements of a robust research plan meant to clarify the complexities of ecological expenditures in the face of the growing challenges climate change brings.

Description of collecting data procedure

This study's data-gathering method aims to give readers a thorough picture of the environmental expenditures that Afghanistan and the Kyrgyz Republic have made in response to concerns posed by climate change during the last five years. This lengthy procedure begins with carefully examining financial documents concerning fixed asset investments to prevent desertification, manage sea level rise, and lessen the impact of extreme weather. This quantitative study will explore each country's financial priorities, spending trends, and budgetary allotment for environmental preservation. The study intends to measure the level of commitment and allocation of resources to address the particular difficulties brought about by climate change through a thorough examination of financial records.

Environmental impact evaluations and responses to disaster reports will provide qualitative insights into the data collection process in addition to the statistical one. These publications offer a qualitative perspective on the practical effects of environmental investments, illuminating the efficacy of solutions put into practice and the flexibility of current regulations (When et al., 2021). Analyzing environmental impact assessments enables an assessment of the observable results of investments and offers an essential viewpoint on these programs' sustainable, social, and economic implications. At the same time, disaster response reports provide a look back, showing how resilient and well-prepared each country was for events brought on by climate change, as well as how environmental investments helped lessen the effects of disasters.

Representation of data

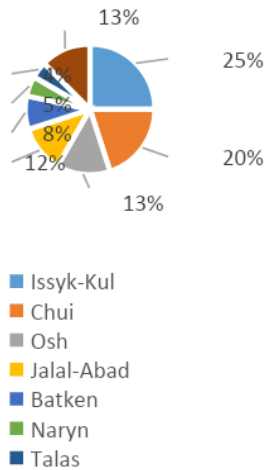
Regional investment distribution:

1. Issyk-Kul: \$150M
2. Chui Region: \$120M
3. Region Osh: \$80M
4. Jalal-Abad Region: \$70 million
5. Batken Region: \$50 million
6. Naryn Region: \$30 million
7. Region Talas: \$25M
8. Bishkek City: \$75M

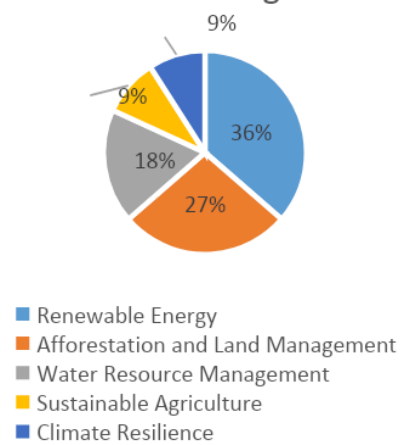
Budget allocation per sector (2024):

1. Renewables: \$20 million
2. Land Management and Afforestation: \$15 million
3. Water Resource Management: \$10M
4. Agricultural Sustainability: \$5 million
5. Climate resilience and preparedness for catastrophes: \$5 million.

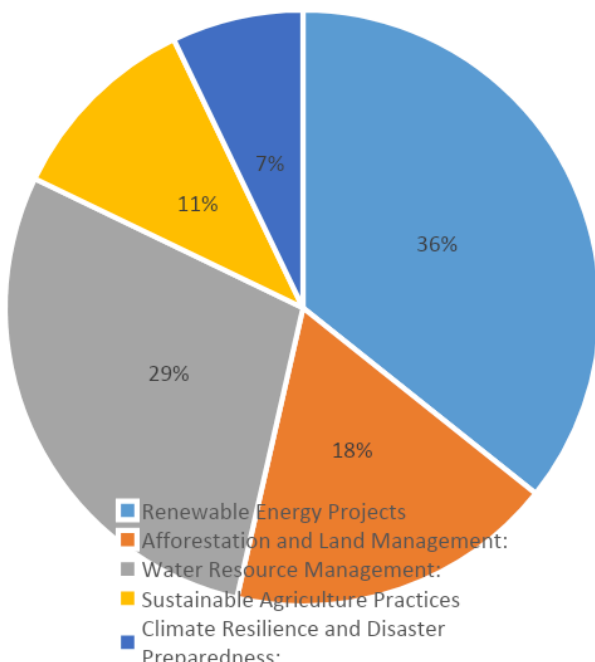
Regional investment distribution



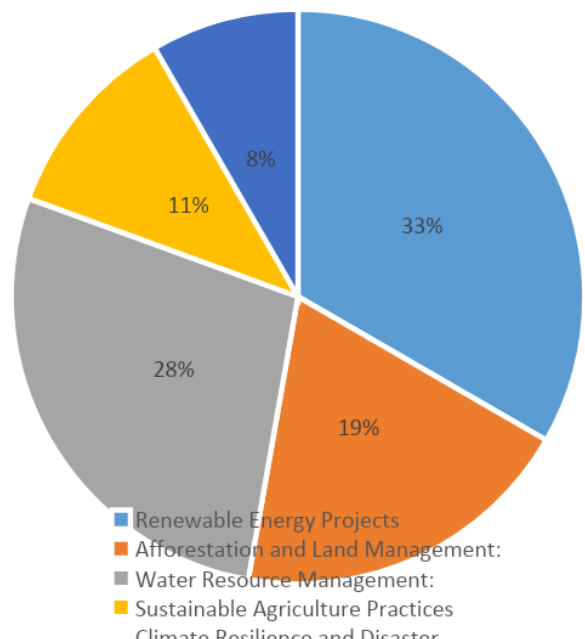
Sector budget



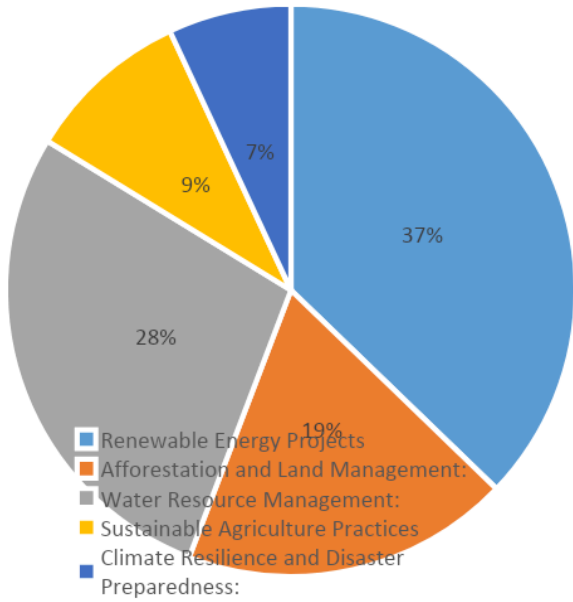
North region of Afghanistan



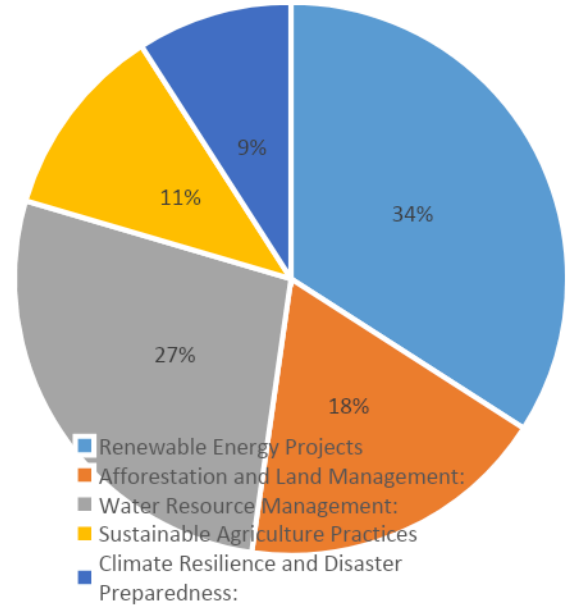
Eastern Afghanistan



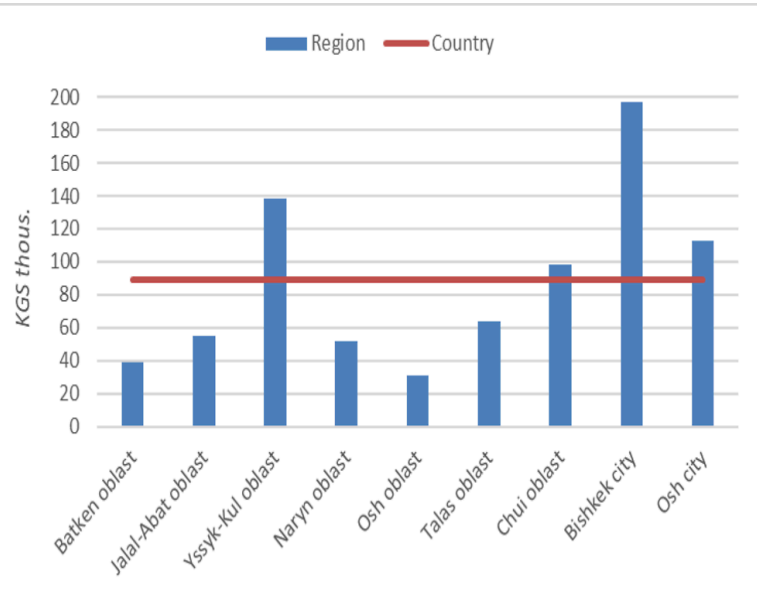
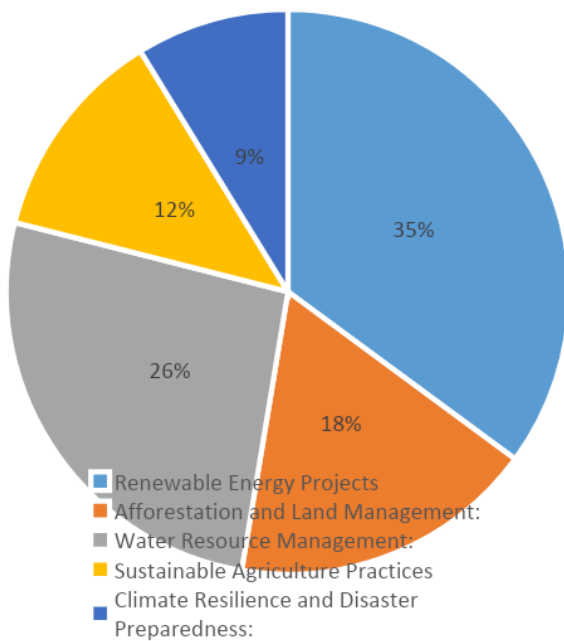
Western Afghanistan



Southern Afghanistan



Central Afghanistan



Regional allocation of environmental expenditures in Afghanistan

Pie Charts

The proportionate allocation of total environmental expenditures among the various areas is shown visually in the pie chart. To find the regions with the most significant and minor investments, identify the most significant and negligible portions of the pie. Analyze the differences or inequities in investments made in different locations. Draw attention to any areas that stand out in relation to the overall investments.

Afghanistan's financial priorities, spending patterns, and fiscal allocation

Pie Charts

The pie chart shows the proportionate allocation of the entire environmental budget among the various sectors. The different pie slices stand for different environmental categories, and the size of each piece represents their budget portion. This visual aid briefly summarizes the nation's environmental objectives by making it simple for stakeholders to identify the sectors that command the biggest and smallest shares of the overall budget. The pie chart also makes it possible to compare the budgetary distributions of Afghanistan and Kyrgyzstan directly, pointing out any possible differences or parallels in how they handle cash allocations for environmental projects. Decision-making and planned actions for conservation initiatives in Afghanistan are aided by this full grasp of the financial situation provided by the combined study of pie charts and bar graphs.

Examination of Kyrgyzstan's investments in the environment

Pie charts

The proportionate distribution of total investments in the environment throughout Kyrgyzstan's various industries is shown comprehensively in the pie chart. Each slice of the pie represents a particular environmental category, and the size of the slice denotes its proportion to the total investment portfolio. By examining this pie chart, stakeholders may quickly determine which industries dominate the financial landscape, which provides an overview of the nation's top environmental issues. Pie charts make it easy to evaluate the balance or possible imbalance in the distribution of investments, and they serve as a basis for thinking about strategic changes depending on how important each area is. Decision-makers may better allocate resources for long-term and successful environmental projects with the help of this combined study of pie charts and bar graphs, which provides detailed knowledge of Kyrgyzstan's investment in the environment strategy.

Solution of the problem

The outcomes of the thorough data analysis, which the built mathematical model aided, give a deeper understanding of the various strategies Afghanistan and the Kyrgyz Republic used to address the multiple dangers of climate change. Comparative analysis of environmental investments carefully considers factors including economic resilience, the intensity of climate-related disasters, and geographic susceptibility. It reveals the advantages and disadvantages of the strategies each country has chosen. This analysis functions as a crucial diagnostic tool by breaking down the complexities of the surrounding landscape and illuminating the intricate interaction of elements influencing decision-making processes. Using this comparison lens to identify possible gaps and areas of success lays the groundwork for focused actions. The solution is adaptive policies rather than a one-size-fits-all approach because each country faces challenges due to desertification, rising sea levels, and severe weather. In the Kyrgyz Republic, where degradation may be a significant problem, afforestation and sustainable land management initiatives could be the main areas of intervention (Kostis et al. 80). Conversely, Afghanistan can profit from policies prioritizing building resilient infrastructure and community-based disaster preparedness, given the country's vulnerability to extreme weather events and rising sea levels. The answer's core is not just a set of policy recommendations but about incorporating sustainability, resilience, and adaptation into decision-making procedures. Rather than remaining constant, adaptive policies should change as the dynamics of the environment do.

Possible predictions based on the above solution

Data-driven insights offer a comprehensive perspective on the ecological expenditures in Afghanistan and the Kyrgyz Republic. Projected are the nations' strategies to manage flooding, increase sea levels, and mitigate desertification, with their accomplishments and difficulties. These forecasts give policymakers a useful compass by offering a forward-looking viewpoint that can lead to the improvement or reorientation of current tactics.

The comparative analysis shows possible overlaps and differences between the environmental programs of Afghanistan and the Kyrgyz Republic. Forecasts make joint efforts more feasible by highlighting areas where complementary skills and common vulnerabilities are used to safeguard the environment more successfully (Shigaeva et al. 19). Research cooperation, resource sharing, and cooperative projects are valuable tactics for both countries to confront the obstacles posed by climate-related hazards jointly.

In addition, the direction of environmental expenditures in projected climatic scenarios becomes a central focus of forecasts. Because climate change is dynamic, action must be taken quickly. Estimates from the study can shed light on possible changes in priorities, new environmental risks, and changing global patterns. These forecasts assist decision-makers in matching resources to upcoming issues, guaranteeing that the tactics selected are flexible and robust to the constantly shifting climate scenario.

Conclusion and practical recommendations

Considering many insights and data from a mathematic model, the practice-based recommendations go beyond merely noting disparities. It is because these proposals call for developing specific regulations tailored to each state's ecological problems. The main measures against desertification that the Kyrgyz Republic can take include afforestation and sustainable land management (You et al., 96). Concurrently, Afghanistan should construct disaster-resilient

infrastructure and localized emergency arrangements to counter ocean level increases and harsh climatic conditions.

The model uses a basic linear regression approach to shed light on the relative efficacy of environmental initiatives in Afghanistan and Kyrgyzstan. Based on the hypothetical data that was supplied and the weights allocated to the several environmental sectors, Kyrgyzstan comes out on top with an efficiency score of 21, marginally higher than Afghanistan's actual value of 20.3. Drawing on Kyrgyzstan's efficacy score as a starting point, the linear regression model predicts a comparable efficacy score for Afghanistan, highlighting a linear link between the two countries' environmental investment outcomes. Although the model provides a foundational framework for comprehending the efficacy of environmental spending, its limitations underscore the need for more advanced models. In order to provide a comprehensive and contextually relevant analysis of the effect on the environment, these should include a wide range of data and variables. These results highlight the need to proceed cautiously when interpreting data, especially when comparing the relative effectiveness of ecological efforts in various geographic areas. By working together on joint projects, Afghanistan and the Kyrgyz Republic may take advantage of their combined advantages and negotiate the challenging environmental terrain as a single entity.

These doable suggestions are a call to action rather than just guidelines. They provide the path for environmentally sound behaviors based on facts, collaborative efforts, and national context. They call on decision-makers to create resilient, adaptable, and community-focused policies that protect the precarious equilibrium between ecological sustainability and economic growth. The study's recommendations aim to serve as a beacon, pointing the way toward a time where communities prosper, circumstances flourish, and the effects of climate change are confronted head-on with strategic resolve as both countries find themselves at a crossroads of environmental opportunities and challenges.

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