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Key Indicators in Analyzing the Sustainability of Afghanistan's Natural Resources

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Abstract

Afghanistan faces major challenges in maintaining the sustainability of its natural resources as part of its sustainable development and poverty alleviation efforts. This study aims to identify factors affecting the sustainability of natural resources in Afghanistan and provide guidelines to achieve more effective management. Using the Analytic Hierarchy Process (AHP) method and a strategic planning model, this study identified and prioritized key factors, including aspects of organizational structure and management, economic, social, cultural, and ecological. The results showed that organizational structure and management were the most important factors with a weight of 38%. This research emphasizes the need for an integrated and systematic management approach to natural resource management, which can improve the economic and social welfare of the community. In addition, strategic planning, monitoring and evaluation are also important elements in ensuring effective resource management. The implications of this research include the proposal of a sustainable natural resource management model that involves community empowerment, integration of local and modern knowledge, economic sustainability, and improved communication between stakeholders.

Keywords: Natural Resources, Development, Sustainability, Afghanistan, Strategic Management.

INTRODUCTION

Afghanistan, located in the heart of Central Asia, has its economic future closely tied to its natural resource potential (Yar, Ihsan, et al., 2022). The country is rich in natural resources, including a wide variety of minerals. Some of Afghanistan's mineral resources are notable for their quality, purity, and ease of extraction, making them almost unparalleled globally (Essar et al., 2021). These mineral reserves represent the greatest hope for the country's economic growth and independence from foreign aid. The Islamic Emirate of Afghanistan aims to transform the current state of the country by replacing foreign aid with revenue from mining (Rupprecht, 2020). Since the early 19th century, numerous domestic and foreign researchers have conducted extensive studies on Afghanistan's mineral resources. These studies estimate the value of the country's

mines to be between one and three trillion dollars (Ahmad & Anctil Avoine, 2018). Afghanistan is abundantly endowed with natural resources, with over 1,400 mining sites identified. Important resources include oil, natural gas, coal, copper, chromium, iron, gold, silver, marble, and emeralds. Economically, Afghanistan ranks among the poorest countries in the world, yet it is among the richest in terms of underground wealth (Yar & Ihsan, 2024). Oil and natural gas have played a crucial role in Afghanistan's economic growth. The first natural gas resources were discovered in 1967, and by the 1980s, the sale of natural gas was generating $300 million annually, accounting for 56% of the country's export income, most of which was exported to the Soviet Union. In 2012, the Ministry of Mines of Afghanistan, along with a U.S. geological research company, announced that gas condensates amounted to 444 billion cubic meters, and oil reserves exceeded 1.5 billion barrels in the Amu Darya basin shared with Tajikistan. The extraction of oil from the Angut oil field in Sar-e Pol province began in the presence of Afghan and Chinese officials, with predictions that Afghanistan would achieve self-sufficiency in oil production within seven years. The projected revenue from this field over the next 23 years is estimated at $7 billion (Levin et al., 2019).

Minerals have been central to the development of civilizations throughout history. After World War II, countries faced a shortage of resources and capital for accelerating economic growth and development. Natural resources generally play a vital role in a country's economic growth by speeding up this process. There are two contrasting views on the impact of rich natural resources on economic growth. The first view considers underground wealth a blessing for economic growth, as seen in countries like Chile and Botswana (Jingyu et al., 2020). The second view, however, describes underground wealth as a curse, as seen in countries like Mexico, Nigeria, and Venezuela, where a lack of strong management led to slower growth compared to countries with fewer natural resources like Hong Kong, Singapore, Taiwan, and South Korea. This phenomenon is known as the "resource curse." (Gwee et al., 2021).

Afghanistan holds the world's second-largest copper deposit, the Aynak mine in Logar province, with an estimated reserve of 240 million tons. The total area of this mine exceeds 800 square kilometers, with an economic value of 13 million tons of copper (Yar, Yasouri, et al., 2022). The Hajigak iron ore deposit is estimated to contain 110 million tons of reserves. These two large mines alone can significantly boost the country's revenue and reduce trade deficits annually. Afghanistan's economic future, following the reduction of foreign aid, heavily relies on revenue from natural resources (Yu et al., 2023). Unemployment, a significant issue in Afghanistan, is exacerbated by the country's growing population. According to the Afghanistan Central Statistics Organization, the total population in 2021 reached 33.6 million, with approximately 400,000 young people entering the job market annually. Many of these individuals migrate abroad in search of employment. The country's economic future largely depends on its rich natural resources. Proper extraction of these resources could create thousands of jobs and increase revenue. Government estimates suggest that the Aynak and Hajigak mines could create over 10,000 jobs annually, reducing foreign dependency and addressing unemployment (Oña et al., 2024).

Afghanistan's economic growth over the past two decades has relied on foreign aid. However, the country's rich mineral resources are seen by experts, policymakers, and international partners as a potential economic boon that could provide significant foreign exchange, attract foreign investment, and play a key role in economic growth and development. It would be a great tragedy if Afghanistan's untouched natural resources, which hold the potential for significant economic and social development, led instead to increased corruption, social tension, and national stagnation, thus falling victim to the resource curse (Yar, Yasouri, et al., 2022). Current economic policymakers need to strategically manage these resources, drawing inspiration from resource-rich countries that have successfully turned their natural wealth into economic prosperity and social welfare. Effective utilization of Afghanistan's natural resources has the potential to transform the country from a poor, aid-dependent nation to one with a robust economic and social development trajectory (Asiedu et al., 2021).

In this study, employing the Analytic Hierarchy Process (AHP) and strategic planning theories, the importance and prioritization of various factors influencing the sustainability of Afghanistan's natural resources have been examined. Among these, the significance of organizational and managerial structure, economic, social and cultural factors, and environmental and ecological aspects has been discussed. The results indicate that among these factors, the organizational and managerial structure holds greater importance with a weight of 38%. This research serves as a basis for discussing the importance of establishing integrated and systematic management for Afghanistan's natural resources and emphasizes its vital role in improving the country's economic and social well-being. Furthermore, it provides a foundation for exploring how Afghanistan can utilize its natural resources as a means to alleviate poverty and enhance sustainable development.

The integration project of livelihood protection and the Chinese government concluded that local capacity-building is the most appropriate method for sustainable rangeland development and livelihood support. They found that strengthening social organizations and institutions is beneficial for building community capacity in this country. Empowering local communities and leveraging other capacities are essential actions to reduce natural resource degradation and transform destructive human activities into constructive factors for natural resources (Bayala, 2024).

The Australian Business Council believes that sustainable development, which meets current needs without limiting the future generation's ability, can be achieved through comprehensive management in financial, environmental, and social dimensions across all company activities, products, and services (Lamolinara et al., 2022).

In southwest Victoria, Grimur developed a framework and set of indicators to evaluate community and ecosystem health. He used these indicators to assess the sustainability of the local ecosystem in Victoria. Grimur aimed to identify indicators that could foster collaboration between

experts involved in sustainable development and residents, creating a common approach to evaluating regional sustainability (Quintero et al., 2021).

Asadi Nelivan and colleagues examined the sustainability of the Taleghan-Zydasht watershed using soil sustainability, vegetation sustainability, and socio-economic sustainability criteria. They reported that the sustainability of the watershed is weak (Hassangavyar et al., 2020).

Zare Chahouki and Sanaei, in their analysis of environmental and managerial factors affecting rangeland ecosystem sustainability, pointed to factors such as wet and dry periods, soil erosion, vegetation exploitation, and rangeland management and improvement. They stated that achieving sustainability in these ecosystems requires understanding these influencing factors and their interactions (Feng et al., 2017).

Chalan and colleagues identified economic sustainability indicators in the customary management of summer rangelands. Their study introduced activity and employment, exploitation, productivity, economic welfare, efficiency, economic justice, economic stability, and government services as economic sustainability evaluation indicators (Zhao & Chen, 2022).

Faraji Sikbar and colleagues used the network analysis process to assess rural sustainability in Fasa County. They explained that due to the interconnection between indicators and criteria in various dimensions, precise sustainability assessment requires attention to different sustainability groups and dimensions independently, utilizing surveys and considering expert opinions (Hasheminasab et al., 2021).

Therefore, group decision-making using questionnaires is highly effective due to the network structure and interdependence of indicators and criteria in hierarchical and network analysis. Partouei, using the network analysis process, identified strategic solutions for issues by applying the basic concept framework and integrating internal and external criteria (Ridder & Schrader, 2019).

Monitoring and evaluation are crucial in ensuring the effective application and improvement of sustainable development principles. This is achieved using indicators that cover all dimensions of sustainable development. Criteria and indicators are tools that help determine the current trend and demonstrate the effects of management actions over time, facilitating decision-making. The ultimate goal of these tools is to gradually enhance activities in the natural resource sector and guide development towards healthier and more productive resources. This study identifies the criteria and indicators essential for sustainable management and uses this information to formulate sustainable strategies and implement appropriate policies (Carli et al., 2018).

Based on this background description, this research aims to identify and analyze factors affecting the sustainability of Afghanistan's natural resources, evaluate various strategies for sustainable management of natural resources, and create a balance between resource utilization and land capacity. In addition, this research also aims to provide a natural resource management model that not only focuses on ecological sustainability but also contributes to the economic and social well-being of the country. By achieving these objectives, the expected benefits of this

research are the availability of natural resource management strategies that can support the reduction of dependence on foreign aid, create jobs, and minimize the risk of falling into the "resource curse" often experienced by countries with abundant natural resources but weak management. It is hoped that this research will provide a foundation for better policy-making in the management of Afghanistan's natural resources for sustainable development.

METHOD

This research is applied in nature and analytical survey in methodology. Information and data were gathered through existing documents and field studies. Initially, the strengths, weaknesses, threats, and opportunities (SWOT) in Afghanistan were identified. Data analysis was conducted using strategic planning and hierarchical analysis models, which are common methods for analyzing actions in strategic planning processes. The goal of analyzing these models is to systematically identify a strategy that aligns best with Afghanistan's context. The logic of this approach is that an effective strategy should maximize the strengths and opportunities while minimizing weaknesses and threats.

The first step in proposing a sustainable natural resource management model is to establish relevant criteria and indicators. This stage involved integrating the opinions of university professors, experts, and natural resource users in Afghanistan, utilizing the strategic planning model to determine criteria and indicators based on strengths, weaknesses, threats, and opportunities.

After identifying ten key indicators experts for factors influencing natural resource sustainability, a questionnaire was developed to prioritize these indicators. This questionnaire was distributed to stakeholders in Afghanistan's natural resources sector, including practitioners, researchers, educators, and users. For sustainable natural resource management, after creating a hierarchical analysis structure, pairwise comparison matrices were used to weigh different approaches and criteria at each level relative to their higher-level elements. The final weights of each criterion and indicator were determined by the model, by combining the insights of professors, experts, and natural resource users, and employing the strategic planning model, criteria and indicators were established based on identified strengths, weaknesses, threats, and opportunities.

RESULT AND DISCUSSION

Strategic Analysis Model

The results derived from the analysis of responses to the questionnaires filled out by experts, professors, and natural resource users in Afghanistan are presented in Tables 2 and 3. These tables identify internal and external factors using a matrix format.

Determining Strategies within the Strategic Analysis Framework

To propose strategies within the strategic analysis model framework, four types of strategies were used: competitive, aggressive, revision, and defensive. For each strategy, two or more related or overlapping components of existing factors were considered. The best strategies for the study area were identified based on these combined factors, and the factors were ranked accordingly.

1. Aggressive Strategies: Utilize internal strengths to maximize external opportunities.
2. Competitive Strategies: Leverage internal strengths to counteract external threats.
3. Conservative Strategies: Use opportunities to compensate for internal weaknesses. Sometimes, there are significant external opportunities, but the organization cannot capitalize on them due to internal weaknesses.

Table 1. Results of the Internal Factors Identification Matrix

Internal Factors	Strengths (S)
The long history of planning and project execution	Presence of laws, regulations, and development programs
Availability of skilled labor	History of collective participation in water resource utilization and grazing systems
Extensive natural resource lands with diverse climates and soils	Jihadi culture, Islamic values, and a rich tradition of Indigenous knowledge
Potential for technical and financial aid from various international bodies, including treaties	

Table 2. Internal Factors - Weaknesses in Natural Resource Management

Internal Factors	Weaknesses (W)
Lack of integrated and systematic natural resource management	Neglect of Indigenous knowledge
Neglect of social issues and user needs	Lack of economic justification for projects
Absence of research support in project implementation	Delays in securing funding

This structured approach helps identify and prioritize the factors influencing sustainable natural resource management in Afghanistan and proposes strategies that align with these factors to achieve sustainable development.

Defensive Strategy Goals

The goal of defensive strategies is to minimize internal weaknesses and avoid external threats. Based on strategic planning analysis, nine strategies were developed to achieve sustainable natural resource management:

1. Integrated and Systematic Management: Implement comprehensive and systematic natural resource management based on potential capabilities in watershed areas.
2. Structural Transformation: Reform the structure of the Forests, Rangelands, and Watershed Management Organization and the Environmental Protection Organization.
3. Enhanced Communication: Improve the connection between research centers, the execution sector, and resource users.

4. Community Empowerment: Empower local communities and resource users.
5. Knowledge Integration: Identify and integrate indigenous knowledge with modern science for the conservation, restoration, development, and utilization of natural resources.
6. Promotion of Sustainability: Promote sustainable natural resource development principles and environmental ethics.
7. Economic Viability: Ensure the economic viability of conservation, rehabilitation, and utilization projects for natural resources.
8. Utilization Reform: Reform the natural resource utilization system and control factors of instability.
9. Sustainable Utilization: Align resource utilization with the land's capacity.

Table 2. Results of the External Factors Identification Matrix

External Factors	Opportunities (O)
Diverse climate and various rangeland and forest species	Availability of skilled, committed, and specialized human resources in the country
Potential benefits for local communities and users from natural resource projects	Presence of research centers and universities for applied natural resource research and training
Existing laws, regulations, and specific guidelines for activities	Historical and beneficial experience in forestry, rangeland management, combating desertification, stabilizing shifting sands, watershed management, land auditing, and protection of national forests
Established community organizations, NGOs, private sectors, and cooperatives for natural resource conservation, rehabilitation, and utilization	Availability of studies in identification, feasibility, and execution phases across various natural resource areas nationwide
Developed maps and atlases of natural resources and watershed management	Economic opportunities beyond biological production in natural resource areas, such as eco-tourism, mining, and renewable energies like solar and wind
Potential use of natural resources in sectors like medicinal plants, industrial plants, edible plants, and forage production	Existing fossil mines
Construction of 7,600 km of forest roads for protection and utilization in the northern forest management projects	Secured over 115 million hectares of national and governmental lands under government ownership
Rich Indigenous knowledge for sustainable natural resource conservation and utilization	

Table 3. External Factors - Threats to Natural Resource Management

External Factors	Threats (T)
Lack of integrated and systematic management	Neglect of Indigenous knowledge
Neglect of social issues and user needs	Neglect of economic justification for projects
Lack of research support in executive projects	Delays in funding allocation
Absence of monitoring and evaluation systems	The mismatch between service descriptions and execution needs

External Factors	Threats (T)
Lack of coordination between implementers and supervisors	Low efficiency of graduates in project preparation and execution
Inadequate status of the natural resources sector in the budget system despite its critical importance as the foundation of life	Inconsistent policies and strategies

Quantifying Strategies

To quantify the strategies, the Quantitative Strategic Planning Matrix (QSPM) was used. This method compares and prioritizes strategies based on their feasibility and excitability. Results indicated that sustainable natural resource development strategies align closely with aggressive strategies. Authorities should leverage strengths and opportunities to move towards these strategies.

Hierarchical Analysis

The results of the importance of the four main criteria in sustainable natural resource management as perceived by experts. The criteria are:

1. Management and Organizational Structure: 38% importance
2. Economic Factors:
3. Social and Cultural Factors:
4. Ecological Issues and Environmental Factors: 12% importance

Among these, integrated and systematic management of natural resources holds the highest weight in the management and organizational structure criterion. In the social and cultural criterion, social capital is the most significant. For economic factors, the most important indicators are entrepreneurship and employment, the valuation of natural resource functions, and the economic viability of operational units. Lastly, in the ecological criterion, land-use planning and aligning resource utilization with land capacity are highly significant.

Discussion

Based on the results obtained from expert opinions, the most significant strengths identified are the extensive natural resource lands in the country with diverse climates and soils, which scored 1.42, and the history of collective participation in water resource management and pastoral systems, scoring 0.31. The combination of these factors can enhance the sustainable development of natural resources.

The most critical weaknesses include delayed funding and the lack of research backing for executive projects, which received the highest score of 0.33. Other notable weaknesses are the absence of a comprehensive perspective in project preparation and execution (0.31) and the low efficiency of graduates in implementing these projects (0.28).

Opportunities scored highest at 0.50, highlighting the availability of community organizations, NGOs, and suitable cooperatives for the conservation, restoration, development, and utilization of natural resources, as well as economic opportunities beyond biological production, including ecotourism, mining, and renewable energy sources like solar and wind.

The most significant threats include the localized funding of some government projects, the lack of cohesive natural resource databases, ineffective use of available information, misalignment of organizational structures with their responsibilities, mismatches in funding and resource allocation with quantitative goals, and the ineffectiveness of existing laws and regulations due to the lack of enforcement guarantees, with final scores of 0.26, 0.21, 0.19, 0.19, and 0.19, respectively.

Based on the findings, empowering local communities and users, identifying and utilizing indigenous knowledge, and integrating it with modern knowledge are crucial strategies for sustainable natural resource development in the country. Community-based management represents a comprehensive, multi-faceted approach to managing natural resources, engaging diverse stakeholders to achieve the ultimate goal of sustainable conservation and utilization.

This approach is socio-economic and cultural, aimed at achieving social justice and democracy in resource management, recognizing people as a potential resource and solution rather than an obstacle. Many researchers emphasize that local participation is essential for the maintenance and protection of natural resources. Comparative studies on non-participatory development projects worldwide highlight the importance of local participation structures and attention to social culture.

Research by Konak revealed that neglecting social considerations incurs high costs. Projects aligned with the socio-economic realities of local populations demonstrated a return rate of about 18.3%, compared to 8% for those that were not. Additionally, projects where beneficiaries only participated during implementation, without early involvement, were unsuccessful.

Experts in natural resources identify the management criteria and organizational structure of the country's natural resources as having the most significant impact on sustainable management. Despite existing challenges such as drought, flooding, and resource degradation, ecological and environmental factors are often deprioritized. This indicates that addressing current resource issues requires indirect methods, particularly focusing on management and organizational structure.

Integrated and systematic management of natural resources, along with collaboration among educational, research, and executive organizations, received the highest importance ratings from experts. Interaction among different sectors can reduce costs and resource waste. Organizations are seen as open systems that must interact with their environment to enhance their competitive advantage.

To achieve their goals, organizations must engage with stakeholders, including investors, suppliers, employees, competitors, local unions, and regulatory bodies. Trust is essential for collaboration and participation among organizations. Organizational trust fosters commitment while creating a learning organization is seen as a strategy for improving performance and long-term sustainability.

Organizational learning involves creating, retaining, and transferring knowledge for the benefit of individuals, groups, and organizations. There is a clear link between sustainable development and organizational learning. Sustainable development is not about maintaining the status quo; it is a continuous process of evolving cooperation in a changing environment, necessitating a dynamic learning process to develop new structures and policies.

Allocating minimal weight to ecological issues does not indicate their insignificance; rather, since the inception of natural resource management, all attention has been directed towards them. There is a significant gap in addressing issues such as management, organizational structure, social and cultural aspects, and economic challenges in sustainable natural resource management in our country. On the other hand, most environmental factors are beyond human control, and only through awareness can specific strategies be adopted to mitigate environmental impacts like droughts, etc. Land use and land cover score highest among ecological criteria indices. Figure (3) illustrates how heavily this criterion is influenced by human activities, necessitating the identification of impactful factors for its management. According to Rasmussen et al., sudden events like corn price drops or migration halts have a greater effect on land use change compared to long-term changes such as precipitation shifts. Global land use change, including increased mining, urban expansion, and residential areas, is the most significant driver of wildlife and natural resource depletion. In the study by Jamshidi and Amini (4), direct human factors alone account for about 31% of the main causes of rangeland degradation, according to natural resource experts in Ilam province, with environmental (16.03%) and indirect human factors (10.96%) and parallel program implementation (8.91%) following.

The social capital index holds the highest importance among social and cultural criteria, according to the expert committee. Social capital is a composite concept with three dimensions: structural, content, and functional. Its social structure consists of social networks, its content comprises trust and social norms, and its function involves social reciprocity. Social participation is synonymous with creating social capital within a community. This capital is defined by the rate of participation in communal life and the presence of trust among individuals, ensuring sustainable development alongside natural capital. When members of a community can participate in solving specific goals, that community possesses social capital (5). Having social capital and participation among all stakeholders, organizations, beneficiaries, and local unions can facilitate achieving natural resource sustainability. Valuing the functions of natural resources and economic monetization of operational units are crucial indicators in economic criteria for natural resources. Achieving sustainable development is impossible without considering natural resources and the livelihoods of resource users. Some scientists argue that land scarcity and the inability to find alternative livelihoods have a significant impact on rural poverty. An essential way to improve livelihood strategies in the present and future is the transition from one form of capital and income to another form of income. Awareness of the importance and value of natural resources has increased among rural communities, but their knowledge and skills on how to improve and

conserve natural resources and reduce pressure on them are limited (10). Rural incomes from alternative livelihoods such as ecotourism, handicrafts, horticulture, medicinal plants, beekeeping, fish farming, etc., can reduce pressure on natural resources. Despite the critical role of natural resources and their diverse functions, unfortunately, in most countries, especially developed ones, their value is only considered in terms of income generation. In recent years, economists have focused on valuing and assessing the role of natural resources in human welfare and have made significant strides in valuing ecosystem and ecological services. These studies underscore the importance of integrating this consideration into sustainable development programs.

CONCLUSION

The conclusions of this study highlight the importance of sustainability assessment as a crucial tool in measuring and evaluating the conditions that support the achievement of sustainable development. Maintaining a balance between natural resource exploitation and land carrying capacity, while preventing land degradation, is a key step in ensuring the sustainability of these resources. Economically viable conservation, restoration and management plans can strengthen local economies that depend on natural resources and improve the welfare of their users. In addition, the adoption of integrated and systematic management approaches, based on watershed potential, is also an important step. Structural transformation within organizations such as the Forests, Rangelands, and Watershed Organization and the Department of Environment, as well as improved communication between research centers and operational sectors, are vital issues that require attention in the context of resource management and organizational structure. Furthermore, empowerment of local communities and resource users, recognition and utilization of indigenous knowledge, and its integration with modern approaches to conservation, restoration, development and sustainable use of natural resources are effective strategies in addressing social and cultural challenges related to natural resources. Overall, designing a sustainable natural resource management model requires a comprehensive understanding of all influencing factors and the interactions between them, quantifying the impact of each.

Future research can make greater contributions in several aspects. Firstly, in-depth research on the mechanisms of integration of local knowledge with modern technology could lead to more effective solutions for sustainable natural resource conservation. Second, empirical studies on the long-term impact of structural transformation in organizations related to natural resource management are needed, especially in terms of the effectiveness of cross-sector communication and implementation. Third, more focused research on the development of more precise quantitative models to measure the interactions between various factors affecting natural resource sustainability would be very useful in designing long-term policies and strategies. This research could also direct efforts towards studying the role of local communities in resource management, including the impact of their empowerment on the success of conservation and environmental restoration programs.

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