CENTRAL ASIAN JOURNAL OF SUSTAINABILITY AND CLIMATE RESEARCH (2024) 3(2):45-62

https://doi.org/10.29258/CAJSCR/2024-R1.v3-2/45-62.eng

Strategic environmental assessment in Uzbekistan: current trends, challenges and future prospects

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ABSTRACT

This study has examined Uzbekistan's environmental assessment framework, focusing on the challenges impeding Strategic Environmental Assessment implementation, as well as how international practices and pilot initiatives can guide the establishment of a robust and sus-tainable domestic SEA system. Through the analysis of legal documents, reports and pilot action outputs, the study has identified deficiencies in decision making and inconsistent mainstreaming of ecological matters into strategic planning. Thus, the major challenges include limited SEA awareness, insufficient baseline data, and weak legal and regulatory setting. Pilot projects, such as the Charvak Free Tourist Zone SEA, had revealed tangible concerns, including difficulties in engaging local stakeholders, data gaps, and unclear inter-agency roles. While these do represent significant obstacles, they also offer valuable lessons learnt for forging a comprehensive SEA scheme. Although the absence of a strong legal basis remains a critical limitation, there exist opportunities to enhance coordination, oversight, and stakeholder inclusivity. Uzbekistan can build on international SEA trends associated with public engagement and climate risk evaluation, while also learning from regional and cross-border actions. Collaborations across Central Asia, particularly in managing shared water and biodiversity resources, render additional opportunities for harmonizing environmental governance. The key priorities include the adoption of SEA legislation, capacity building through training and awareness programs, and the establishment of national networking and information exchange mechanisms. These steps are vital for fostering sustaina-ble development, preserving natural resources, and building public trust in ecological governance. The study findings furnish actionable insights for policymakers and practitioners in Uzbekistan and other nations facing similar environmental assessment challenges.

ARTICLE HISTORY

Received:
June 18, 2024
Accepted:
December 5, 2024
Published:
December 25, 2024

KEYWORDS

environment, environmental assessment, legal framework, policymaking, strategic environ-mental assessment, sustainable

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Published by Kazakh German University, Almaty/Kazakhstan

1. Introduction

The expansion of Strategic Environmental Assessment (SEA) addresses the mounting demand for sustainable development (SD) and environmental considerations. SEA methodically evaluates ecological consequences to promote the SD narrative within policies, programs, and plans (PPPs) (Helbron & Palekhov, 2010; Jackson & Illsley, 2008; Nzioki & Kitulazzi, 2016). It likewise serves a comprehensive tool for accommodating environmental and health objectives in strategic decision-making aimed at alleviating adverse economic and regional development effects (Sabeva, 2015; UNECE, 2018). SEA considers environmental and health issues during the formulation of PPPs (Fischer et al., 2010; Uganda, 2006), promoting nature-sensitive development. SEA also pushes the evolution of worldwide SD by detecting and assessing potential ecological impacts (Song & Kim, 2007; UNECE, 2003). The SEA application and study have been thorough in the Global North; however, its effectiveness in countries like Uzbekistan is still uncertain. This study aimed to answer the following questions: What are the challenges and opportunities for implementing SEA in Uzbekistan, and how SEA can contribute to sustainable development? This analysis explored Uzbekistan's socio-political and environmental landscape to assist other countries encountering similar challenges.

The SEA Protocol and Espoo Convention represent essential legal SEA frameworks on a global scale (Koyano, 2020; Marsden, 2011; Mulder, 2011). Both advocate for sustainable progress and ecological stewardship, albeit in distinct domains. On the one hand, the Espoo Convention of February 25, 1991 requires environmental impact assessments and international consultations regarding transboundary ecological effects of major development projects (Koyano, 2020; Marsden, 2011). On the other hand, the SEA Protocol – ratified May 21, 2003 – emphasizes the importance of incorporating environmental dimensions in initial planning in designated regions. Public engagement and preliminary evaluations are deemed fundamental for achieving sustainable development (UNECE, 2003).

Moreover, Directive 2001/42/EC of June 27, 2001, commonly referred to as the SEA Directive, serves a core EU legal basis for strategic environmental assessment (Kläne & Albrecht, 2005; Sheate, 2003) and requires environmental assessment of plans and activities with significant ecological impacts (Feldmann et al., 2001). The Directive also highlights the importance of rendering due attention to environmental considerations while elaborating and executing SD-related plans and programs via informed decision-making (SEA Directive, 2001).

SEA plays a crucial role in shaping government initiatives across sectors, as well as informs decision-making in agriculture, forestry, fishery, energy, industry (including mining), transportation, regional development, waste and water

management, telecommunications, tourism, urban planning, and land use; although it does not automatically extend over other economic sectoral or municipal plans, or minor revisions. National governments are mandated to assess the need for SEA. It is essential to implement this process when a plan, program, or minor modification is likely to result in compelling environmental or health impacts. Along with financial/budgetary plans and programs, national defence and civil emergency plans and programs are SEA-exempt (Spar, 2012) – i.e. the SEA Protocol applies solely to newly introduced plans and programs by national and local public agencies, excluding any pre-existing strategic documents.

A systemic approach merges environmental objectives into planning and decision-making associated with PPPs (Ahmed et al., 2005; Corpade et al., 2012). The associated scoping identifies key ecological issues and stakeholder concerns after confirming an assessment necessity and scope. The initial assessment examines the environment and analyses impacts by reviewing possible outcomes, explores potential options, and formulates risk reduction strategies. SEA reports are exhaustive and detailed, featuring quality assurance measures to secure precision and adherence to standards (Saleh & Qutb, 2021; Souloutzoglou & Tasopoulou, 2020). Evaluation strategies scrutinize the execution and ecological effects, whereas discussions with regulatory bodies and community engagement ensure openness and ownership (Reicher et al., 2021).

That said, SEA remains inadequately reflected in Uzbekistan's national-level planning, even in the remit of striking infrastructural and industrial growth. The country is confronted with challenges such as water scarcity, land deterioration, and air pollution (Gafurova & Juliyev, 2021; Makhmudov et al., 2023; Tukhtayeva, 2020), as well as exhibits a notably high rate of water withdrawal per capita further exacerbating water scarcity (World Bank, 2020).

Against this backdrop, the nation has implemented environmental laws and sustainability initiatives aimed at improving its environmental governance, although making decisions without thoroughly inspecting their environmental aftermath compromises their intent. This research aimed to explore Uzbekistan's need to incorporate strategic environmental assessment into its development framework to tackle ecological challenges and foster sustainable progress.

To evaluate the target country's preparedness for SEA and its potential influence on sustainable development goals (SDGs), this investigation has employed a mixed-method strategy comprising a review of Uzbekistan's valid environmental policies, analysis of globally applied SEA frameworks, and consultation with regional environmental data.

This research offers empirical evidence regarding the function of SEA in promoting sustainable environmental governance in post-Soviet nations and, thus,

establishes a foundation for future comparative research as well as contributes to the discourse on the effectiveness of SEA in addressing environmental challenges in rapidly developing economies. This study emphasizes the significance of SEA in promoting sustainable development and adhering to international ecological standards; analyzes the challenges and opportunities that Uzbekistan government faces in implementing efficient environmental governance strategies; and manifests an inaugural examination of the application of SEA in Uzbekistan, closing a significant gap in the existing academic literature and offering novel insights into the nation's environmental assessment framework.

2. Methodology

A sweeping literature review was conducted to collect relevant information on SEA, with a particular emphasis on its prospective implementation in Uzbekistan, including to analyze existing literature, legal documents, and policy reports pertinent to SEA, utilizing a qualitative research design. Using the keywords such as "Uzbekistan", "environmental governance", "SEA", and "Strategic Environmental Assessment", the search strategy covered numerous academic databases, including Scopus, Web of Science, and Google Scholar. The search was limited to peer-reviewed articles, reports, and policy documents published in English from 2000 onwards to guarantee their relevance to the ongoing ecological challenges of Uzbekistan and the policy frameworks associated with current SEA practices.

Titles and abstracts were initially screened according to the predetermined criteria, and full texts were subsequently reviewed in detail to guarantee the inclusion of high-quality and substantial information on SEA frameworks, case studies from comparable contexts, and best practices in environmental governance. The criteria for source selection were as follows: relevance to SEA frameworks, applicability to Uzbekistan or analogous emerging economies, emphasis on legal enforcement, and alignment with best environmental governance practices. The process entailed the identification of pertinent sources that offered an all-inclusive understanding of SEA principles and practices.

The review allowed identifying a notable deficiency in the scientific literature regarding SEA in Uzbekistan – mere absence of thematic peer-reviewed articles. While SEA serves mainly as a tool for policy and development organizations, studies related to SEA from various contexts offer essential insights for its implementation in emerging economies such as the target country. This study has investigated SEA frameworks and their performance in comparable regions, addressing a scientific gap related to the applicability and potential impact of SEA within Uzbekistan's distinct socio-

environmental context. To address this discrepancy, numerous reports were generated by a variety of programs implemented in Uzbekistan. Those papers provided essential information and insights essential for understanding the current state and prospects of SEA in the country. Additionally, legal documents were obtained from the national legislative database of the Republic of Uzbekistan (www.lex.uz). Functioning as the sole official electronic medium for disseminating legal acts passed in the Republic of Uzbekistan (RUz), this resource represents the primary legal information repository of the state. It was essential for the acquisition of relevant legal documents on the national ecological assessment system. Additionally, online inquiries were conducted to identify supplementary reports and international legal documents, thereby expanding the scope of sources and guaranteeing a comprehensive compilation of relevant information.

A two-step procedure was utilized to identify the challenges and solutions outlined in the results section (Table II.). Thematic analysis was first applied to national legal documents, policy reports, and international SEA case studies to identify prevalent challenges and possible strategies. This analysis involved categorizing key themes related to sector-specific issues, legal and procedural barriers, and challenges in environmental governance in RUz. Secondly, the authors' firsthand experience in implementing experimental SEA projects in Uzbekistan contributed valuable insights to the findings, facilitating the incorporation of practical challenges and context-specific solutions. The integration of experiential insights and thematic analysis enabled a thorough understanding of the issues and potential solutions specific to the Uzbek context.

In order to facilitate an in-depth assessment, sources were selected based on their relevance to the primary concerns of SEA implementation, legal frameworks, environmental governance practices, and the unique context of the RUz. The harvested data underwent meticulous analysis to detect the most common themes, trends, and gaps in Uzbekistan’s current SEA procedures. This approach provided a profound examination of SEA application in Uzbekistan’s situation.

The review’s credibility and integrity were maintained by rigorously adhering to ethical considerations that ensured accurate data representation and proper source referencing. The analysis was conducted impartially to provide a balanced and objective perspective on the subject matter, and all information sources were appropriately acknowledged.

2.1. Historical development and current global SEA status

The SEA can be traced back to the US National Environmental Policy Act (NEPA) of 1969 that had introduced the concept of Environmental Impact Statements (EIS) for major federal actions (Fundingsland Tetlow & Hanusch, 2012). Over the years,

the practice of SEA has significantly evolved, influenced by various international frameworks and agreements. In the late 1980s and early 1990s, several countries began implementing SEA provisions, often building on their existing EIA frameworks (Josimović et al., 2022). Those provisions were typically integrated into one of the four categories: EIA laws (e.g., the USA), planning regulations (e.g., Sweden), administrative orders or policy directives (e.g., Canada), or processes of policy appraisal and plan evaluation (e.g., the United Kingdom) (Fundingsland Tetlow & Hanusch, 2012). The adoption of SEA frameworks has been growing ever since with notable developments in international policies and directives.

The key milestones in SEA overall evolution include the adoption of the United Nations Economic Commission for Europe (UNECE) Protocol on SEA to the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) in 2003 (Grout et al., 2018; Souloutzoglou & Tasopoulou, 2020). The Protocol emphasizes the importance of integrating ecological assessments into policies and programs. The European Union's SEA Directive 2001/42/EC, adopted in 2001, requires member states to ensure that certain plans and programs undergo environmental assessment, promoting SD by incorporating ecological considerations from the outset (European Union, 2001). SEA is applied across a wide range of strategic activities, including national, regional, and local PPPs (Baynova, 2021).

SEA gained global prominence following the EU Directive on SEA and SEA Protocol. East and Southeast Asian nations, including Hong Kong, China, Taiwan, Vietnam, South Korea, and Indonesia, have embedded SEA into their environmental assessment frameworks to examine ecological and social impacts of PPPs. SEA is widely utilized in Nepal, Pakistan, and India for various PPPs, notably in forest planning, hydropower development, drainage initiatives, coastal zone management, and industrial growth (Hossan et al., 2021).

In recent years, various worldwide trends have influenced the development and implementation of SEA frameworks. Public participation has emerged as an essential element, guaranteeing decision-making transparency and inclusivity. The introduction of digital instruments, including Geographic Information Systems (GIS) and remote sensing, has markedly improved data collection, analysis, and visualization capabilities. Moreover, SEA frameworks have been progressively integrating climate risk assessments to comply with the objectives of the Paris Agreement, highlighting both adaptation and mitigation solutions. Furthermore, transboundary SEA projects are also gaining prominence facilitating cross-country cooperation to tackle shared ecological issues and advance SD regionally.

In summary, SEA renders a structured path for mainstreaming environmental agenda in high-level decision-making, supporting SD, nature protection, and climate change mitigation.

2.2. Current environmental assessment system and SEA trends in Uzbekistan

The evolution of ecological assessment in the target country has been marked by the introduction of various legal acts to streamline and improve the associated procedures. Table I. below chronologically outlines the aforementioned legal documents, highlighting their key provisions and status. This historical context provides a foundation for understanding the existing framework and gaps still requiring attention to fully instill SEA into national development planning.

Table I. Evolution of legal documents in Uzbekistan's environmental assessment system.

Year	Legal Act	Key Provisions	Status
1992	Law “On Nature Protection” of the RUz	Establishes procedures for EIA (RUz, 1992)	Active
2000	Law “On Ecological Appraisal” of the RUz	Provides environmental appraisal guidelines (RUz, 2000)	Active
2018	Resolution of the Cabinet of Ministers of the RUz “On approving the Regulation on the state ecological appraisal”	Detailed regulations for state ecological appraisal implementation (RUz, 2018)	No longer valid
2019	Decree of the President of the RUz “On approving the 2030 Environmental Protection Concept of the RUz”	Describes initial steps to introduce the SEA mechanism into state sectoral policy, including plans, programs, and other strategic documents (RUz, 2019)	Active
2020	Resolution of the Cabinet of Ministers of the RUz “On further improvement of the EIA mechanism”	Latest update to refine and enhance the EIA process (RUz, 2020)	Active
2024	Law “On State Ecological Appraisal and Environmental Impact Assessment” of the RUz	Basis of SEA in Uzbekistan (RUz, n.d.)	Under development

Uzbekistan’s ecological assessment system is predominantly structured around the EIA and State Ecological Appraisal (SEAUZ) models (Khotuleva et al., 2023). Within this system, developers are tasked with organizing and conducting EIAs, ensuring the completeness, accuracy, and quality of the environmental impact materials submitted for SEAUZ. The SEAUZ, carried out by the designated body, culminates in a mandatory conclusion determining whether a proposed activity can proceed

based on its potential ecological impacts. The conclusion is binding for all legal and physical entities involved in financing and implementing the project.

Nonetheless, considering these provisions, the ongoing practices demonstrate serious drawbacks, such as restricted public engagement, poor transparency, and lack of robust alignment with international standards. The importance of stakeholder engagement in SEA cannot be overstated, as it guarantees proper consideration of diverse perspectives, making the assessment process more inclusive and transparent. Yet, Uzbekistan still faces significant challenges in this regard, as evidenced by the Charvak FTZ pilot SEA. Stakeholder consultations during the project had pointed to gaps in awareness and participation, particularly among local authorities and community members alike, partly due to the absence of clear legal requirements for stakeholder involvement and lack of structured consultation mechanisms.

To bridge these gaps, the RUz could adopt best practices from international SEA frameworks, such as the use of participatory GIS for community mapping and digital tools for public consultations. These methods enable stakeholders to visualize potential environmental impacts and meaningfully contribute to the assessment. Establishing a formalized framework for stakeholder engagement with clear timelines and responsibilities would promote their systematic participation. The aforementioned steps are essential for building trust and fostering collaboration among all parties involved in SEA.

The present framework lacks specific requirements for SEAUZ documentation and processes, leading to insufficient integration of ecological assessments in strategic planning efforts. As a result, national strategic acts like development programs and sectoral strategies often bypass the rigorous ecological scrutiny necessary for ensuring sustainable development (Smutny et al., 2021). This gap results in fragmented and inconsistent environmental assessments incompatible with international standards, including these outlined in the SEA Protocol.

Today, Uzbekistan’s legislation lacks a formal foundation for SEA execution, although the country has been taking steps to enhance its investment environment as part of its broader economic growth strategy.

The absence of SEA in these cases has revealed gaps in environmental planning, particularly in assessing cumulative impacts and fostering effective stakeholder engagement. By way of demonstrating a strong sustainability commitment, implementing SEA under such projects would echo Uzbekistan’s priorities of nature conservation and enhancing its investor attractiveness.

Public participation in EIA and SEAUZ procedures is currently minimal and not systematically integrated, falling short of international norms. Public consultations are often non-mandatory and infrequent, thereby diminishing the community’s ability to influence ecological decision-making.

The current system is likewise hampered by insufficient resources and lack of a clear institutional mandate to execute SEAs effectively (OSCE, 2021). This inadequacy is evident in the absence of detailed SEAUZ procedures, inter alia screening, scoping, and environmental reporting. Additionally, there is still ambiguity regarding the roles and responsibilities of different governmental bodies in the SEAUZ process, leading to inefficiencies and overlaps in environmental governance.

The limitations of Uzbekistan's current EIA and SEAUZ system are stark when compared to the comprehensive requirements of SEA as outlined in international frameworks such as the SEA Protocol. The lack of a systemic approach towards SEA means that strategic documents often fail to encompass broad nature-related considerations, resulting in decisions that may not fully account for long-term ecological impacts (OSCE, 2021). While EIA focuses on project-specific impacts, SEA is designed to evaluate the environmental effects of policies, plans, and programs at a higher strategic level. This higher-tier scope is crucial for SD, yet remains underdeveloped within Uzbekistan's current framework.

Moreover, the ongoing system's deficiency in terms of public participation and transparency represents a significant shortcoming. International SEA standards emphasize the importance of engaging the public and stakeholders early on and throughout the assessment process, ensuring that every voice is heard, and that decision-making is more democratic and informed. In contrast, Uzbekistan's existing processes do not adequately facilitate such engagement potentially curbing public trust and delivering suboptimal environmental outcomes.

2.2.1. Recent initiatives and law-making

During 2018-2021, in collaboration with UNECE and Organization for Security and Co-operation in Europe (OSCE), the national Ministry of Ecology, Environmental Protection and Climate Change (MEEPCC) undertook projects aimed at reviewing national legislation, proposing enhancements, and raising awareness regarding SEA. As part of these initiatives, the law on SEA was drafted and underwent review by relevant government agencies. Additionally, a needs assessment was conducted to evaluate the requirements for SEA implementation, leading to the elaboration of the Action Plan for SEA Execution in the RUz (Smutny et al., 2021).

The Law of the RUz "On State Ecological Appraisal and Environmental Impact Assessment" (anticipated in 2024) represents a significant step towards bridging this gap serving a core regulation on Strategic Environmental Assessment in the country. As of May 20, 2024, the act had underwent public discussion via the Portal for Discussing Draft Normative and Legal Documents (six proposals received), concluding the public discussion phase (RUz, 2024).

As per current legislation, it is imperative to ascertain the compatibility of diverse economic and other activities planned or ongoing within the country's territory with ecological standards as well as to assess their feasibility. The State Environmental Appraisal Center, operating under the MEEPCC auspices, conducts state ecological appraisal through its branches in the Republic of Karakalpakstan, constituencies, and the city of Tashkent.

2.3. Pilot SEA projects

In the absence of a functional national legal framework on SEA, in the RUz the strategic environmental assessment is currently only possible on a pilot or voluntary basis with a rather limited scope, thereby not fully leveraging the benefits of the mechanism. Given the situation, pilot SEA applications are particularly valuable for "testing" draft SEA provisions and building the necessary capacities. Several pilot SEAs supported by foreign institutions are currently in progress in Uzbekistan – for example, the German Society for International Cooperation (GIZ) conducted the SEA of the 2022-2023 Roadmap for the 2030 Concept of Forestry Development of the RUz (Decree of the President #PP-4850, 2020; Khotuleva et al., 2023).

Additionally, the project known as "Support for the Implementation of a Pilot Strategic Environmental Assessment" was executed by the Global Green Growth Institute (GGGI) in collaboration with the French Development Agency (AFD) and MEEPCC. That initiative focused on the Charvak Free Tourist Zone (FTZ), as detailed in Presidential Decree No. DP-5611 of January 5, 2019 (News, 2023). The Charvak FTZ project – launched in February 2023 and concluding in December 2024 – is situated in Bostonlik District of Tashkent Region and hallmarks the first practical implementation of SEA in Uzbekistan, and seeks to advance sustainable tourism by examining the prospects and obstacles in terms of applying strategic ecological evaluations in Uzbekistan.

The Charvak FTZ is a strategically designated area (Fig. 1.) created following Presidential Decree No. PF-5273 of December 5, 2017. Spanning 94,805 ha, the FTZ was established to capitalize on the region's tourism potential, improve recreational opportunities, and stimulate economic growth through modern investment strategies. The Charvak FTZ is a crucial element of Uzbekistan's holistic strategy of improving tourism infrastructure and fostering SD.

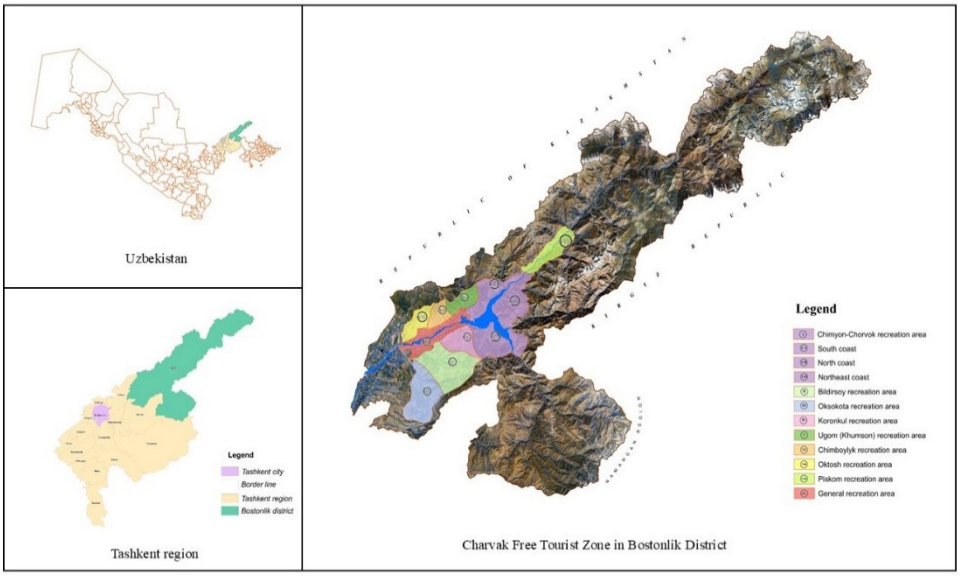

Fig. 1. Location map of the Charvak FTZ in Bostonlik District, Tashkent Region, Uzbekistan.

During the implementation of the pilot project, significant challenges arose, particularly as to stakeholder engagement, especially local authorities, throughout the SEA process. The issues encountered largely stemmed from the absence of explicit domestic regulations, i.e. not delineating the responsibilities of the parties involved in SEA execution. Consequently, the importance of voluntary participation was not consistently acknowledged. Furthermore, the lack of adequate information from public sources to assess the impacts on the nature and human health posed a problem. Coupled with the lack of a centralized database to support the required analyses, the absence of a structured SEA framework in Uzbekistan further complicated the situation.

The Charvak FTZ SEA outcomes outline a definitive strategy for tackling local ecological concerns. Significant obstacles – like landscape deterioration, biodiversity risks, water and air pollution and waste management challenges – necessitate immediate target actions. Considering the situation, the SEA put forward various strategies to mitigate adverse impacts, including the enforcement of robust sustainable land use and construction regulations, creation of designated eco-zones to safeguard sensitive habitats, and implementation of thorough waste management schemes. Further suggestions highlighted the importance of enhancing public transportation networks to mitigate air pollution and constructing sewage treatment plants to avert water contamination. The strategies outlined are designed to reduce environmental risks and promote the sustainable advancement of the Charvak FTZ.

3. Results and discussion

Effective execution of SEA in Uzbekistan encounters numerous substantial obstacles – the corresponding proposed solutions as per this study's findings are presented in Table II.

Table II. Main challenges of SEA in Uzbekistan and proposed solutions.

Main challenges	Proposed solutions from the research
Lack of national legislation to support SEA execution	Currently, there is no legal basis for applying SEA for PPPs in Uzbekistan. However, a preliminary legal document was drafted and underwent public discussion (as of June 3, 2024). It is essential to finalize and adopt this legal act as soon as possible.
Insufficient capacity to efficiently coordinate environmental assessment procedures among governmental authorities	Uzbekistan's authorities lack experience in coordinating SEA due to its novelty. To close this gap, blanket capacity-building is necessary.
Lack of procedural clarity and ambiguity surrounding the roles and responsibilities of the key actors involved in health impact assessment	Although the responsibilities and participation of the main actors in SEA implementation are clearer in terms of environmental assessment, the actor roles and participation in health impact assessment are not clearly defined. The new law should address this aspect.
Shortage of experts proficient in environmental and health analyses	Uzbekistan possesses a sufficient number of experts in EIA and State Ecological Appraisal (SEAUZ); however, there is a notable lack of experience of Strategic Environmental Assessment. To address this deficiency, it is imperative to organize training programs abroad for target experts to acquire international experience, and arrange training sessions involving globally recognized experts; furthermore, introducing SEA as a discipline at higher education institutions represents the primary solution to mitigate this issue.
Lack of necessary information, inadequate or poor-quality data in open sources, and difficulties in obtaining relevant information	Posting information necessary for SEA on the government website "Open Information Portal of the Republic of Uzbekistan", supplementing existing national information with regional and local information and ensuring their regular updates; further strengthening information dissemination by mandated organizations such as state bodies and scientific research institutes.

The suggested steps can greatly improve Uzbekistan's capacity to properly execute SEA, thus reinforcing environmental governance and advancing SD practices. Effective implementation of these solutions requires coordinated efforts on behalf of authorities and pertinent stakeholders, promoting a collaborative strategy towards SEA.

The insights from pilot SEA projects, such as the Charvak FTZ, provide valuable support for these findings. The Charvak FTZ pilot SEA – conducted in collaboration with GGGI and AFD – has highlighted several critical issues, including stakeholder engagement predicaments, particularly local authorities, due to poor familiarity with SEA processes and unclear responsibilities. Moreover, the absence of high-quality baseline data on environmental conditions like biodiversity and water resources limited the assessment's comprehensiveness. These shortcomings were compounded by the absence of a national SEA framework, leading to fragmented coordination among agencies and delayed decision-making. Despite these hindrances, the pilot demonstrated the importance of establishing a legal framework, improving data accessibility, and enhancing stakeholder engagement to ensure SEA's success in Uzbekistan.

Uzbekistan's development of its SEA framework is informed by international instruments, including the SEA Protocol to the Espoo Convention and EU SEA Directive. The draft SEA law of the RUz reflects international standards thereby laying groundwork for environmental assessments tailored to the nation's unique legal and governance context.

By incorporating the lessons learnt from the Charvak FTZ pilot project, Uzbekistan can close the existing gaps effectively. For instance, targeted trainings for stakeholders and public servants would raise their SEA awareness. Additionally, a centralized ecological database would boost the quality of future assessments. These practical measures are vital for aligning Uzbekistan's SEA practices with international norms while also customizing them to local conditions.

Uzbekistan has been harmonizing its practices with global standards while simultaneously adapting the SEA framework to suit local peculiarities, acknowledging the current capabilities of its institutions and existing environmental law. The insights obtained from domestic pilot SEA projects reiterate the findings of this study – the former demonstrate that the prevalent lack of familiarity with SEA among local stakeholders manifests a considerable burden to effective implementation, highlighting the necessity for targeted training and more explicit procedural guidelines.

By implementing target and contextually relevant responses to these challenges, Uzbekistan has the potential to endow a fully operational national SEA framework stimulating SD in line with international environmental governance models.

4. Future prospects

The future of SEA in Uzbekistan holds significant promise as the country is increasingly recognizing the importance of sustainable development and nature protection. As the country moves towards adopting holistic SEA legislation, it is

possible to note several emerging trends and opportunities. The anticipated Law of the RUz “On State Ecological Appraisal and Environmental Impact Assessment” – due in 2024 – represents a pivotal step in formalizing SEA practices. This legislation is poised to provide a robust legal foundation, thereby facilitating SEA mainstreaming into national PPPs.

Continuous efforts to build capacity among government authorities, planners, and stakeholders will be crucial for nurturing necessary skills and knowledge required for effective SEA execution. Additionally, international collaborations and partnerships could offer valuable expertise and resources, helping to boost institutional facility and best practices.

Implementing pilot SEA projects, as done currently with foreign support, will serve to “testing” and refining SEA procedures. Such pilot actions are instrumental in providing practical insights and lessons that can inform broader SEA application across various sectors in Uzbekistan. By examining the outcomes and methodologies of these pilot projects, stakeholders can identify effective strategies and potential pitfalls, thereby raising the overall cogency of SEA practices.

Leveraging advanced technologies like GIS and remote sensing can cardinally enhance SEA quality and efficiency. These technologies can facilitate improved data collection, analysis, and visualization, making SEA more potent in terms of identifying and mitigating ecological impacts. The integration of such technologies can also streamline the assessment process itself, providing more accurate and exhaustive environmental data to inform decision-making.

Enhancing public participation and transparency in the SEA process is critical for fostering trust and collaboration. Forging clear stakeholder engagement mechanisms and ensuring public access to relevant information is fundamental in this regard. Globally, there is a shift towards increased inclusivity in SEA processes, which Uzbekistan is incorporating by expanding the government website “Open Information Portal of the Republic of Uzbekistan”. This web portal can be further developed to serve as a platform for disseminating information and facilitating public input. By promoting transparency and inclusivity, Uzbekistan can ensure due consideration of diverse viewpoints, thereby elevating the legitimacy and validity of SEA outcomes.

Given Uzbekistan's strategic location in Central Asia, it possesses substantial potential for regional-level ecological cooperation. SEA has been globally used as a tool for transboundary environmental collaborations, and Uzbekistan’s SEA framework could promote similar initiatives in Central Asia. Collective SEA initiatives with neighbouring countries could address transboundary environmental impacts and promote regional sustainability. In its turn, such co-action could lead to the emergence of harmonized ecological standards and practices, fostering a more integrated and effective nature management modus operandi across the region.

5. Conclusion

The detailed analysis of SEA in Uzbekistan pinpoints significant challenges and opportunities for bettering environmental governance and promoting sustainable development. The forthcoming Law of the RUz "On State Ecological Appraisal and Environmental Impact Assessment" is crucial for formalizing SEA practices and integrating them into national PPPs. Continual capacity-building through trainings, workshops and seminars is imperative for equipping government bodies, planners, and stakeholders with the necessary skillset. Calibrating these efforts with global SEA trends, such as strengthening public participation and increasing data transparency, will ensure that Uzbekistan's SEA framework meets international standards.

Pilot SEA projects have demonstrated the potential to refine procedures and provide practical insights for broader application, as well as have contributed to the growing body of global knowledge, offering a model for SEA implementation in other emerging economies facing similar challenges. The case of the Charvak FTZ pilot SEA emphasizes the importance of addressing data gaps and engaging local stakeholders systemically. The project insights underscore the necessity to enhance inter-agency coordination and establish baseline environmental data to support effective SEA. Advanced technologies like GIS and remote sensing can aid data collection, analysis and visualization, improving the overall SEA efficiency and effectiveness. Following global shifts toward digital integration in SEA, these technologies will support Uzbekistan in conducting more data-driven and transparent assessments. Enhancing public participation and transparency via stakeholder engagement mechanisms and developing the "Open Information Portal of the Republic of Uzbekistan" will garner trust and collaboration.

Regional cooperation in Central Asia provides an additional dimension for leveraging SEA to achieve transboundary ecological objectives associated, for example, with shared water resources and biodiversity conservation. Establishing collaborative regional-level SEA frameworks can facilitate knowledge sharing and cross-adjust national sustainable development policies. Uzbekistan's active participation in these efforts can set a precedent for regional environmental governance.

In summary, successful SEA implementation in Uzbekistan depends on legislative enhancements, capacity building, technological integration, public participation, and regional cooperation. Delivering on these tasks will improve ecological governance and support SD, ensuring the protection of natural resources for future generations.

Concluding, it is worth mentioning certain limitations that this study has faced. The analysis was predominantly based on secondary sources, such as legal documents, policy and pilot project outcome reports. Albeit abundant and substantive, these sources may not comprehensively reflect the latest or undocumented SEA related

developments within Uzbekistan. Further research should focus on integrating primary data collection methods, including interviews and field-based assessments, to validate findings and expand the analysis scope. Additionally, longitudinal studies could help evaluating the long-term impacts and adaptability of SEA in Uzbekistan, offering valuable insights for other countries with similar contexts.

Acknowledgments

The study team would like to express gratitude to the Global Green Growth Institute (GGGI) Uzbekistan for support and cooperation during the independent consultancy. Although this research was conducted independently, certain insights and information gathered during the consultancy were valuable in shaping this paper. The authors appreciate the opportunities and resources provided by GGGI Uzbekistan that have contributed to understanding the SEA framework in Uzbekistan.

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