Urban Legislation and SDG Localization: A Pathway for Amman's Sustainable Future

Zayed Zeadat *

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Article

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Zayed Zeadat

American University of Madaba; info@aum.edu.jo
* Correspondence: z.zeadat@aum.edu.jo

Abstract: Significant global challenges, particularly in the areas of economics, society, and the environment, are posed by urbanization. In this researcher-led study, we look at how Jordan is trying to bring the Sustainable Development Goals (SDGs) to life in its capital, Amman, by bringing urban laws in line with these global goals. The paper finds legislative flaws that prevent SDG incorporation through a thorough analysis of the Amman Building and Regulation Act of 2019. Some of the main points covered are public participation, the use of renewable energy sources, sustainable construction practices, resilience in urban areas, and the management of natural resources. Although a lot of work has gone into it, the analysis shows that if Jordan wants to accomplish the 2030 Agenda and have sustainable urban growth in the future, it must overcome these institutional and legal barriers. As a model for other cities facing a similar challenge, Amman is being asked to lead the way in SDG localization through more public involvement, new laws, and innovative resource management.

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1. Introduction

Presently, more than half of the world's population resides in metropolitan regions, and projections indicate that by 2050, there will be an additional 2.5 billion individuals living in cities [1]. Unplanned urbanization is closely associated with a multitude of challenges that cover economic, social, and environmental dimensions. From an economic standpoint, it has the potential to exacerbate poverty and homelessness, while placing strain on critical infrastructure such as educational and hospital institutions. Socially, it often leads to increased discrimination and inequality, which in turn leads to disparities in mental and physical well-being. Unplanned urban growth can result in adverse environmental effects, including floods, greenhouse gas emissions, water pollution, and the degradation of natural ecosystems [2-7]. The United Nations (UN) implemented the 2030 Agenda for Sustainable Development (referred to as the Agenda) as a comprehensive strategic framework, which received approval from all 193 Member States in 2015. The Agenda aims to mobilize a global coalition to address the challenges associated with urbanization. The Sustainable Development Goals (SDGs), created by the United Nations as part of the Agenda, play a vital role in advancing sustainable global economic expansion [8-12]. The Sustainable Development Goals (SDGs) comprise 17 interconnected goals and 169 linked targets that encompass many dimensions of social, economic, and ecological sustainability. These goals and targets offer a complete framework for tackling intricate difficulties. For a graphic depiction of these aims and ambitions, please see Figure 1 [13-19].

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Figure 1. SDGs.

Almost two-thirds of the SDGs include some kind of urban component [20,21], highlighting the centrality of cities to the advancement of sustainable development in the Agenda. Ensuring universal involvement and opportunity for everyone is emphasized by the SDGs' basic principles of equity and inclusion [22–26]. The SDGs aim to establish a more equitable and just society by addressing inequities in income, education, and access to key services [ibid]. In addition, by tackling topics like climate action, clean energy, and responsible consumption and production, the SDGs proactively promote environmental sustainability [27–29]. To achieve sustainable growth in the long run, we must resolve to protect Earth's ecosystems and natural resources [ibid]. In addition to tackling transnational concerns like infectious diseases and climate change, the SDGs promote international collaboration by going beyond national boundaries and encouraging nations to work together on common problems [30]. A strong accountability structure is set up by the SDGs, so that progress can be measured and seen clearly [31, 32]. The goals allow for effective tracking and strategy modification by making stakeholders and governments responsible for their promises [33–35].

2. Jordan's Pledge to Sustainability

Jordan, officially the Hashemite Kingdom of Jordan, is a country in northern Arabian Peninsula that spans the Jordan River's eastern bank. Political uncertainty surrounds the nation, which is already in a precarious position relative to its neighbors [36]. There has been an extraordinary increase in the population of Jordan, which has multiplied by more than 10 in the last 55 years [37]. The widespread geopolitical unrest in the area is causing forced migration and an influx of refugees, which in turn is driving up the population density [38].

Reiterating its dedication to including sustainable urban development at national, regional, and municipal levels, Jordan signed the Agenda in 2015 [39–44]. By 2030, Jordan hopes to have contributed to the global goals outlined in the Agenda [45–47]. As part of this pledge, the government will incorporate the SDGs into its long-term goals for economic, social, and environmental development, as well as launch new programs to address specific social, economic, and environmental issues.

Rising concerns about environmental impact, economic inequality, and social welfare at the national level are likely to have far-reaching consequences for Jordan's city planning in the years ahead [48-50]. Jordan Vision 2025, the Government's Indicative Executive Programme 2021–2024 (GIEP), the Jordan De-velopment Portal, the National Railway Project, the National Strategy for Women in Jordan 2022–2025, the National Social Protection Strategy 2019–2025, the Higher National Committee for Sustainable Development, and a number of other initiatives have been launched by the GoJ to fulfill this promise [51–53].

Governments in Jordan have received funding to improve their data collection and analysis capabilities [54]. Training and resources are provided by the Ministry of Planning and International Cooperation and other partners to improve data collection and reporting at the local level [55-57]. The ability to make choices based on evidence and successfully track progress is given to

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municipalities by this. To assist local development efforts, Jordan aggressively pursues money from international donors, bilateral partners, and national sources [59-60]. Mobilizing resources is a crucial aspect of SDG localization [58]. To that end, it is recommended that public-private partnerships (PPPs) be formed in order to pool resources and knowledge [61–63].

According to national development objectives, Jordanian municipalities are to harmonize the SDGs at the local level [64-66]. Take Amman, Jordan, for example. They've launched a slew of programs to further sustainable development goals. To achieve these goals, projects like the Water Desalination and Conveyance Project, Green City Action Plan (GCAP) for Amman, Amman Climate Action Plan, and the Amman Resilience Strategy have been established.

The 2030 Agenda has been in place since 2015, and GAM has made great strides in localizing and achieving the SDGs since then. However, there are a number of obstacles that Amman must overcome in order to localize the SDGs. These include a lack of urban data that is categorized according to different criteria, limited access to finance and resources, and a lack of institutional capacities, particularly in the area of public sector activity coordination [67].

To evaluate its success in bringing the SDGs to a local level, GAM has initiated a Voluntary Local Review (VLR). This extensive evaluation aims to critically examine Amman's VLR, highlighting its merits and faults, and providing vital insights for future attempts to improve. In particular, the Amman VLR drew its inspiration from Volumes 1 and 2 of the Guidelines for VLRs published by UN-Habitat and the UCLG [68,69]. Under the auspices of the Greater Amman Municipality (GAM), this monumental undertaking is being spearheaded by illustrious institutions like as UNESCWA, UN-Habitat, and UCLG-MEWA. The goals of the evaluation are to evaluate Amman's performance in relation to SDGs 3, 7, 9, 11, 13, and 17 [70].

As part of GAM, the VLR Committee is in charge of monitoring the VLR initiative. More than 60 entities from the public and business sectors, civil society, academia, and several UN and international organizations were involved in the meticulous compilation of this study, highlighting the comprehensive consultation that characterized this project. The strength of Amman's VLR is in its clear dedication to the SDGs, which shows that the city understands how important these global objectives are and is determined to make them a part of local policy and practice.

In the future, Jordan is anticipated to maintain its dedication to implementing the SDGs on a local level [70]. In the Middle East, Jordan stands out as a prime example of a sustainable development goal (SDG) localization initiative, because to its government's emphasis on the topic and its commitment to decentralization and participatory governance. But there are a number of obstacles that Jordan must overcome on this trip. Significant obstacles to localizing the SDGs include a lack of resources, geographical instability, and, most crucially, legislative restrictions at the local level [71–77].

Several academics have stressed the importance of urban legislation as a tool for swift and sustainable implementation of the Sustainable Development Goals (SDGs) [78–81]. Thus, the purpose of this research is to analyze the Amman Building and Regulation Act of 2019 and its provisions in order to identify any gaps or obstacles that might slow down Amman's efforts to implement the Sustainable Development Goals (SDGs).

3. Amman urban law

Located within the capital governorate of Jordan, Amman is the cultural, political, and economic hub of the country [82–89]. Its northwestern Jordanian position, at the crossroads of many trade routes, makes it an important hub for banking, education, industry, and commerce [ibid]. Amman is home to 36% of Jordan’s population, including a large number of refugees [89-93], making it the country’s principal urban and commercial hub. The city is facing a number of socioeconomic problems caused by the inflow of migrants and the fast growth of the city, which is outstripping the capacity to build environmentally friendly infrastructure [ibid].

According to several accounts, Amman is a dynamic and ever-changing metropolis that is always growing [82], changing shape [94, 95]. The main administrative body that governs the city is the Greater Amman Municipality (GAM) [96]. The current set of rules that control how Amman is

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run is outlined in the Building System and Regulation in the City of Amman 2019, which was previously issued under Article (67) of Law No. (79) of the Urban Planning, Villages, and Buildings Law 1966.

With the preservation of its rich legacy and the promotion of resilience, modernism, safety, sustainability, and investor and resident attraction, GAM aspires to make Amman a leading municipality. Amman 2025 is the foundation of a holistic approach to urban planning that aims to realize this goal [97]. In the last ten years, GAM has created a wide variety of plans, policies, collaborations, and strategies that are all in line with the SDGs [98]. A major stride toward sustainable urban development in Jordan, these projects will make the city more resilient, environmentally friendly, and safer for everyone [99-100]

4. Material and Methods

The evaluation of the 2019 Amman Building and Regulation Act will be conducted as a policy analysis framework utilizing Bardach and Patashnik 's Eightfold Path [71] (Figure 2). This study aims to determine the specific legal obstacles that hinder the implementation of Sustainable Development Goals (SDGs) in Amman, Jordan. The fundamental issue lies in the absence of legal backing for sustainable urban development, with a specific emphasis on renewable energy, sustainable building, and public engagement. To do this, a comprehensive examination of the pertinent policy papers was conducted. The Amman Building and Regulation Act of 2019 formed the fundamental basis for urban growth in Amman by establishing the necessary legislative structure. The research has thoroughly examined each article of the Amman Building and Regulation Act to assess if it aligns with, hinders, or requires enhancement to contribute to the achievement of the Sustainable Development Goals (SDGs). This comprehensive research facilitated the identification of the precise legislative elements that either facilitate or impede progress towards the attainment of sustainable development goals for urban development. Areas that were identified as requiring improvement were given priority for policy suggestions.

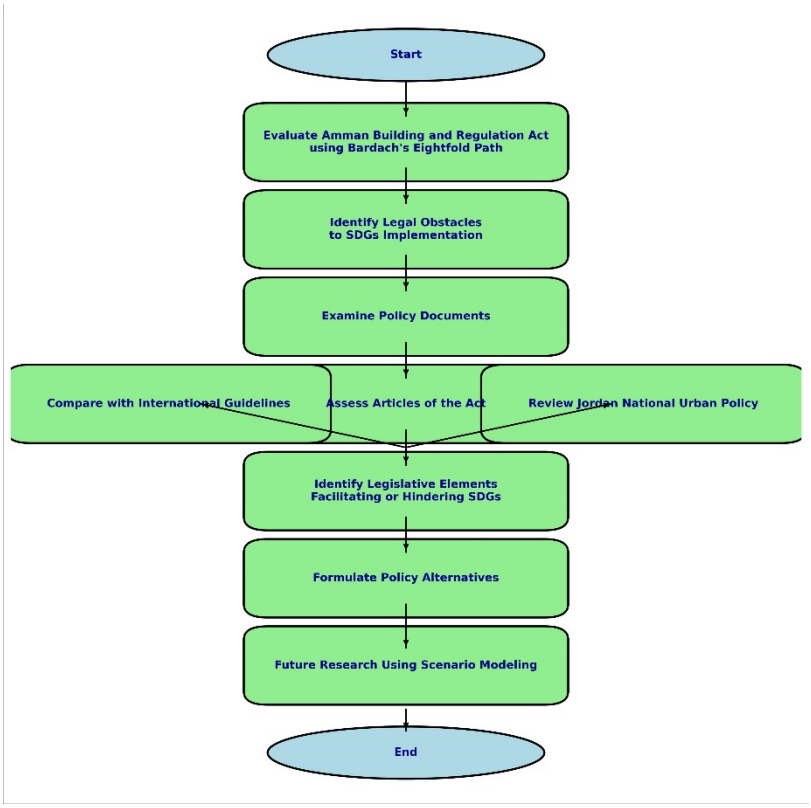

Figure 2. Research Methodology Flowchart.

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The Jordan National Urban Policy was reviewed with the Amman Building and Regulation Act. This policy provides strategic principles for urban planning and development across the whole nation. This policy has undergone scrutiny to assess its objectives and guidelines pertaining to the localization of Sustainable Development Goals (SDGs) and to identify any inconsistencies or deficiencies in relation to the Amman Building and Regulation Act.

To provide a comprehensive perspective on urban sustainability and the execution of the Sustainable Development Goals (SDGs), policy papers from international organizations such as the United Nations Human Settlements Programme and the United Nations Development Programme have been thoroughly examined. The "World Cities Report" from UN-Habitat and the VLR Guidelines were important texts that provided recommendations on the best practices and standards for urban governance and sustainability. The international papers were compared with local rules to identify any discrepancies and areas that may be enhanced.

After conducting a comprehensive review, several policy alternatives were formulated. " By *alternatives*, we mean something like "policy options," or "alternative courses of action," or "alternative strategies of intervention to solve or mitigate the problem." [71, p.18]. These encompass recommendations to the Amman Building and Regulation Act, implementation of requirements for renewable energy, public participation, and establishment of guidelines for sustainable building materials.

It is anticipated that using scenario modeling and expert input in future research projects would produce reliable study results [71]. Enhancing the validity and dependability of research may be achieved by sharing results and proposals with stakeholders, such as the Greater Amman Municipality (GAM), through policy briefings and presentations. By utilizing triangulation of policy documents, expert opinions, and academic literature, the conclusions may be ensured to be valid and reliable. Given the qualitative character of the study, it is important to take into account potential biases in personal perspectives. Incorporating quantitative methodologies in future study might enhance the confirmation of these findings, leading to a more thorough knowledge of the concerns.

4. Discussion

Localizing SDGs inside Jordanian towns demonstrates the country's will to tackle urgent global issues from the ground up [72]. When it comes to meeting the needs of residents and tackling issues of local development, municipalities play a pivotal role [101–103]. Implementing effective legal frameworks and policies is crucial for the accomplishment of SDGs [104-108]. Still, lawmakers in Amman need to fix a number of problems with the Amman Building and Regulation Act of 2019 if they want to make it easier for the city to implement the SDGs. The following is a list of these problems:

- *Lack of public Inclusion and Empowerment*

Sustainable development is important to Jordan, and one of its pillars is participatory governance [104]. In an attempt to localize the SDGs, the commercial sector, people, civil society groups, and communities are actively encouraged to participate in decision-making processes [109–112]. Target 10.2 aims to ensure that all individuals can participate in development without barriers to their social, economic, or political empowerment; this is in line with Target 11.3, which aims to promote inclusive and sustainable urbanization through participatory, integrated, and sustainable human settlement planning. It should be noted, however, that this approach is not explicitly endorsed by the Amman Building and Regulation Act of 2019. Public engagement is mostly limited to objections to land use plan revisions under the Act, which grants this power exclusively to registered property owners or their chosen representatives as recorded with the Jordanian Department of Land and Survey. To achieve the Sustainable Development Goals (SDGs) and to foster social resilience, it is crucial for individuals to get involved at the local level [113]. If someone is affected by a development plan, strategic plan, area plan, or any change or removal of the land use plan, they have the right to challenge the validity of the plan, change, removal, or order by providing sufficient grounds. Any challenge, be it to the plan, its amendment, repeal, or any associated di-rective, will not affect this right. This will enhance Amman's inclusiveness, safety, and resilience. To make sure

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that the localization of SDGs fits in with what people want, it's important to have public discussions, hold town hall meetings, and have community-led initiatives [114-116].

- *Insufficient Advancement of Affordable and Clean Energy Utilization*

The goal of this effort is in line with Sustainable Development Goal 7, which states that everyone should have access to modern, affordable, dependable, and sustainable energy [117]. The vast majority of Amman's population lives in apartment buildings where the roof is owned by many people. As a result, a lot of people have trouble making the most of their roof space by installing solar panels. A fair distribution of rooftop space among building occupants is crucial for addressing issues related to shared ownership, especially when it comes to promoting the broad use of residential solar PV systems [118]. For these renewable energy projects to run smoothly, it would be helpful if laws allowed the Department of Land and Survey to officially assign areas on property ownership certificates (Qushan). To overcome these obstacles and make it easier to deploy residential solar PV systems, rooftop space should be distributed fairly among building occupants.

- *Imprudent Use of Natural Resources*

In order to maintain ecosystems, biodiversity, and human civilizations' varied demands, land and water are crucial natural resources [119–121]. Specific zoning requirements, including minimum acreage and needed road frontage, are outlined in Article 21 of the Act, which deals with land division. Aligning division choices with economic and spatial development goals is an essential but currently unmet need for land division approval [122]. The Act's Article 22 lays out the requirements for sanctioning land division, with an emphasis on administrative and technical standards and little attention to environmental implications. In most cases, these constraints will cover things like minimum area needs, specifications for road access, topographic maps of the property, and the length and width of the roads in the region. Land division operations may have negative effects on the environment, but the present framework does not include any measures to assess or lessen these effects. Urban expansion, especially onto rain-fed agricultural fields on the outskirts of Amman, might worsen if this condition is not included. Achieving SDG 11.6—which seeks to lessen the environmental effect of cities—would be greatly hindered in this scenario. The purposeful and sustainable expansion of cities might be achieved by incorporating a requirement that land division approvals take economic development demands into account [122]. In addition to promoting effective land use and preserving agricultural regions crucial for local food security and environmental sustainability, this method is in line with urban planning concepts that strive to minimize environmental damage [123].

Article 49/a of the Act states that in order to manage water resources, building owners and developers must include water wells in their projects. Well capacity and size are not explicitly addressed in these rules. This leads many developers, especially those working on bigger projects, to install wells that are too little. By reducing the negative effects of natural catastrophes like flash floods on urban infrastructure, linking well size regulations to the building's area ratio in legislation will guarantee compliance and achieve SDG 11, Target 11.5. By encouraging sustainable practices and enhancing the resilience of urban infrastructure, such regulatory alignment will also help achieve SDG 9, Target 9.4. In order to promote sustainable urban growth and catastrophe resilience, this method seeks to alleviate the strain on Amman's stormwater drainage system, which is currently deteriorating [124].

Within the framework of stormwater mitigation, it is imperative that buildings, regardless of development type, dedicate a minimum of 10% of their land surface to planted and vegetated places. However, in order to fulfill the standards for pre-occupancy inspections, many real estate developers temporarily cover paved portions with soil, which they then remove. This way, they avoid this obligation. Inadequate oversight of this regulation's execution runs counter to Sustainable Development Goals 11, Target 11.5 (minimizing the negative effects of natural catastrophes), and 9, Target 9.4 (encouraging long-term improvements to infrastructure and businesses). It is critical to enhance enforcement mechanisms. One way to do this is to have trained landscaping experts check that the areas that have been landscaped actually have drought-tolerant plants planted, as stated in

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Article 45. In order to improve the sustainability and resilience of urban areas, these experts should provide certificates of conformity attesting to the adoption of sustainable practices [125].

The present legislation noticeably does not address the use of greywater recycling. Implementing Sustainable Development Goal (SDG) 6, and more specifically target 6.3, which aims to improve water quality through pollution reduction and increased water recycling [125], requires large-scale developments to include greywater recycling systems. For example, in order to water their landscape, business centers, hotels, hospitals, heavy industries, and high-density mixed-use buildings should be required to have greywater recycling systems installed. Reducing the pressure on fresh water resources is possible through the treatment and reuse of greywater, which is wastewater produced by household activities including washing clothes, dishes, and taking showers. Saving money on water bills, reducing wastewater discharge, and conserving drinkable water are just a few of the many advantages that may be gained by incorporating greywater recycling into city infrastructure. In addition, instead of draining precious freshwater resources, green spaces may be watered with recovered greywater, which promotes sustainable urban growth [126].

Greywater recycling can only be effectively implemented if the national building code has thorough instructions and requirements [127]. Ensuring the safety, efficiency, and compliance with health requirements of greywater recycling systems should be the focus of these guidelines, which should cover their design, installation, and maintenance. Greywater recycling systems can be widely adopted if developers are incentivized to include them. One way to help achieve SDG 6.3 and create more sustainable urban environments is to update the laws so that large-scale developments are required to recycle their grey water. Water conservation, reduced environmental effect, and improved urban landscape sustainability can be achieved if lawmakers mandate greywater recycling systems for commercial malls, heavy industries, and high-density mixed-use units [127-129].

- *Deficit of Legislative Support for Sustainable Industrialization*

Industrial land uses, including the notoriously large-scale environmental impacts of heavy industry, are defined in Article 18 of the law. Noise pollution, gas emissions, and the discharge of industrial byproducts are just a few ways these sectors exacerbate pollution and its detrimental effects on the environment. The goal of SDG Target 9.4 is to increase the efficiency of resource use and the adoption of clean, environmentally sustainable technology and industrial processes. One way to achieve this is through regulatory measures that make green industrial operations a requirement for building licenses. Furthermore, legislation should be enacted to prohibit the establishment of heavy businesses close to forests or water resources, in accordance with SDG Target 11.4, which highlights the preservation and protection of natural heritage, particularly in Jordan's setting. Before any building license can be issued, this regulatory framework should make it essential to submit an environmental impact assessment (EIA). To guarantee that development operations in Jordan do not endanger the integrity of the country's natural ecosystems, it is necessary to conduct a thorough evaluation of possible environmental consequences [131]. The natural and constructed habitats of Jordan may be better protected from harmful effects on the environment and maintained in good condition for future generations if lawmakers follow these strict guidelines and encourage sustainable industrial practices [132].

- *Insufficient Deployment of Green Infrastructure*

There are no precise requirements for the required proportion of green cover under Article 32 of the Act, however it does authorize the creation of outdoor parking lots. Because there is a lack of regulation, many real estate investors just asphalt the whole lot. These behaviors amplify the effects of urban heat islands by causing nearby structures to accumulate heat. The goal of SDG 11, and more especially target 11.6, is to lessen the negative per capita environmental impact of cities, such as the heat island effect, and this result runs counter to that. Environmental sustainability, urban resilience, and ecological balance are all jeopardized when outdoor parking lots are not required to have green cover. The increased cooling demands of nearby buildings are a direct result of asphalt surfaces' contribution to higher surface temperatures, which in turn increases energy consumption [133,134]. Enhanced thermal load has the potential to trigger a domino effect of detrimental environmental

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effects, such as worsening urban air quality and increasing emissions of greenhouse gases. Green cover criteria in urban development projects must be clearly defined and enforced by legal frameworks in order for them to be in line with SDG goal 11.6. By incorporating these standards into Article 32, we may create more resilient cities, lessen the impact of the urban heat island, and encourage more sustainable urban ecosystems. By bringing local development practices in line with global sustainability goals, these actions will help create cities that are healthier and more livable, which in turn supports human and ecological health [133,134].

In order to fulfill the 10% green cover requirement, cellar floors can be used as green spaces according to Article 37/c of the Act. But it's not possible to grow healthy plants on top of a cementitious surface, thus this method is faulty in principle. No amount of soil improvement or strong roots can help trees and plants flourish on an impermeable concrete surface.

In addition, the national building code does not adequately address the unique requirements for intense and extensive green roofs. When it comes to installing green roof systems, consultants and contractors face significant obstacles due to this lack of regulation. The efficacy and longevity of both extensive green roofs—defined by shallow soil depths and low-maintenance vegetation—and intensive green roofs—which support a broader range of plants but necessitate deeper soil and more maintenance—require comprehensive protocols. Despite the importance of green roof systems for urban sustainability, their broad adoption is impeded by the absence of a standardized national construction code. Among the many environmental advantages of green roofs are the mitigation of urban heat islands, better control of runoff, more biodiversity, and cleaner air. They also help save energy since they insulate buildings, which means less need for heating and cooling [136].

The development and incorporation of comprehensive criteria for green roofs into the national construction code is critical for resolving these concerns. Soil depth, plant choice, watering needs, and structural load considerations are all important factors that these guidelines should address. Consulting firms and construction companies would benefit greatly from well-defined standards and best practices when it comes to green roof design and installation. Urban development may be brought into accordance with Sustainable Development Goal (SDG) 11, specifically goal 11.6, if lawmakers update Article 37/c to incorporate practical and enforceable standards for green cover and provide thorough standards for green roofs. By bringing these two goals into harmony, we can build cities that are better for people and the planet [135–136].

- *Underutilization of Sustainable Construction Material Practices*

The use of designated dumping locations for all excavation and demolition debris is mandated by Article 50 of the Act, which deals with the disposal of solid waste from building projects. One important practice for furthering SDG 12, Target 12.6, which encourages enterprises to adopt sustainable practices and integrate sustainability information into their reporting cycle, is on-site construction recycling. Unfortunately, the legislation does not provide any incentives for real estate developers to participate in this activity. Implementing material passports is a great way to boost recycling on-site in the building industry [137]. Construction materials can have their composition, origin, and recycling and reusability possibilities detailed in a digital record called a material passport. To lessen the burden on fresh resources and maximize efficiency, developers may use this tool to catalog and identify materials that can be recovered and reused in future projects. One way that law might help accomplish SDG goal 12.6 is by requiring material passports. This would push the building sector to adopt more sustainable methods. For the sake of both the environment and the economy, this strategy will encourage a circular economy in the building industry, which will have positive effects in the long run [138].

Legislators should amend Article 50 to provide incentives for property developers to utilize material passports in order to put this idea into action. Financial subsidies, scholarships, or certification-based advantages could all play a role in encouraging green building methods. To further facilitate the incorporation of material passports into industry standards, it is helpful to provide guidelines and offer training on their usage.

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5. Conclusions

The process of incorporating the Sustainable Development Goals into the city of Amman shows how important it is for local laws and global sustainability goals to be in sync with each other. It shows that, even though there has been a lot of progress, there are still huge problems in the political and institutional scene.

Improving public involvement, using more green energy, managing natural resources better, making cities more resistant to shocks and stresses, and following sustainable building standards are all things that will help Amman reach its SDGs. All of these plans call for changes to the regulatory system and new, more creative ways to handle resources. Second, involving the public through open governance will help keep the SDGs rooted in the wants and goals of the community.

Many other towns that are having the same problems will look to Amman as an example of how to deal with these issues. It will show how good city laws can help make the 2030 Agenda come true. Strong legal and administrative structures and a strong dedication to sustainable urban development make it possible for Amman and all cities around the world to have a resilient, inclusive, and sustainable future.

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References

1. United Nations. (2018). World Urbanization Prospects: The 2018 Revision. Department of Economic and Social Affairs, Population Division. Retrieved from https://population.un.org/wup/
2. Rahaman, M. A., Kalam, A., & Al-Mamun, M. (2023). Unplanned urbanization and health risks of Dhaka City in Bangladesh: uncovering the associations between urban environment and public health. Frontiers in Public Health, 11, 1269362.
3. Aliyu, A. A., & Amadu, L. (2017). Urbanization, cities, and health: the challenges to Nigeria–a review. Annals of African medicine, 16(4), 149-158.
4. Zhang, X. Q. (2016). The trends, promises and challenges of urbanisation in the world. Habitat international, 54, 241-252.
5. Swan, A. (2010). How increased urbanisation has induced flooding problems in the UK: A lesson for African cities?. Physics and Chemistry of the Earth, Parts A/B/C, 35(13-14), 643-647.
6. Godfrey, R., & Julien, M. (2005). Urbanisation and health. Clinical Medicine, 5(2), 137.
7. Ichimura, M. (2003, January). Urbanization, urban environment and land use: challenges and opportunities. In Asia-Pacific Forum for Environment and Development, Expert Meeting (Vol. 23, pp. 1-14).
8. Tsalis, T. A., Malamateniou, K. E., Koulouriotis, D., & Nikolaou, I. E. (2020). New challenges for corporate sustainability reporting: United Nations' 2030 Agenda for sustainable development and the sustainable development goals. Corporate Social Responsibility and Environmental Management, 27(4), 1617-1629.
9. Boluk, K. A., Cavaliere, C. T., & Higgins-Desbiolles, F. (2019). A critical framework for interrogating the United Nations Sustainable Development Goals 2030 Agenda in tourism. Journal of Sustainable Tourism.
10. Bebbington, J., & Unerman, J. (2018). Achieving the United Nations Sustainable Development Goals: an enabling role for accounting research. Accounting, Auditing & Accountability Journal, 31(1), 2-24.
11. Biermann, F., Kanie, N., & Kim, R. E. (2017). Global governance by goal-setting: the novel approach of the UN Sustainable Development Goals. Current Opinion in Environmental Sustainability, 26, 26-31.
12. Di Baldassarre, G., Sivapalan, M., Rusca, M., Cudennec, C., Garcia, M., Kreibich, H., ... & Blöschl, G. (2019). Sociohydrology: scientific challenges in addressing the sustainable development goals. Water Resources Research, 55(8), 6327-6355.
13. Morton, S., Pencheon, D., & Bickler, G. (2019). The sustainable development goals provide an important framework for addressing dangerous climate change and achieving wider public health benefits. Public Health, 174, 65-68.

 doi:10.20944/preprints202408.1794.v1

14. Raub, S. P., & Martin-Rios, C. (2019). "Think sustainable, act local"–a stakeholder-filter-model for translating SDGs into sustainability initiatives with local impact. International Journal of Contemporary Hospitality Management, 31(6), 2428-2447.
15. Maher, R., Maher, M., Mann, S., & McAlpine, C. A. (2018). Integrating design thinking with sustainability science: a Research through Design approach. Sustainability science, 13, 1565-1587.
16. Butcher, S., Acuto, M., & Trundle, A. (2021). Leaving no urban citizens behind: An urban equality framework for deploying the sustainable development goals. One Earth, 4(11), 1548-1556.
17. Niyommaneerat, W., Suwanteep, K., & Chavalparit, O. (2023). Sustainability indicators to achieve a circular economy: A case study of renewable energy and plastic waste recycling corporate social responsibility (CSR) projects in Thailand. Journal of Cleaner Production, 391, 136203.
18. Schwerhoff, G., & Sy, M. (2017). Financing renewable energy in Africa–Key challenge of the sustainable development goals. Renewable and Sustainable Energy Reviews, 75, 393-401.
19. Nazzal, M. (2005). Economic reform in Jordan: an analysis of structural adjustment and qualified industrial zones. Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.554.3433&rep=rep1&type=pdf
20. UN News. (2023, October 31). UN calls for global action to turn cities into engines of sustainable development. Retrieved from https://news.un.org/en/story/2023/10/1132767
21. UN-Habitat. (2022). World Cities Report 2022. Retrieved from https://unhabitat.org/wcr2022
22. Zeadat, Z. F. (2023). Strategies toward Greater Youth Participation in Jordan's Urban Policymaking. Journal of Sustainable Real Estate, 15(1), 2204534.
23. Alomari, F., & Khataybeh, A. (2021). Understanding of sustainable development goals: The case for Yarmouk University Science students in Jordan. Pegem Journal of Education and Instruction, 11(2), 43-51.
24. Boeren, E., & Field, J. (2019). 4th Global Report on Adult Learning and Education: Leave No One Behind--Participation, Equity and Inclusion. UNESCO Institute for Lifelong Learning.
25. Fukuda-Parr, S., & Smaavik Hegstad, T. (2019). "Leaving no one behind" as a site of contestation and reinterpretation. Journal of Globalization and Development, 9(2), 20180037.
26. Winkler, I. T., & Satterthwaite, M. L. (2018). Leaving no one behind? Persistent inequalities in the SDGs. In The Sustainable Development Goals and Human Rights (pp. 51-75). Routledge.
27. Breuer, A., & Leininger, J. (2021). Horizontal accountability for SDG implementation: A comparative cross-national analysis of emerging national accountability regimes. Sustainability, 13(13), 7002.
28. Bowen, K. J., Cradock-Henry, N. A., Koch, F., Patterson, J., Häyhä, T., Vogt, J., & Barbi, F. (2017). Implementing the "Sustainable Development Goals": towards addressing three key governance challenges—collective action, trade-offs, and accountability. Current opinion in environmental sustainability, 26, 90-96.
29. Donald, K., & Way, S. A. (2016). Accountability for the sustainable development goals: a lost opportunity?. Ethics & International Affairs, 30(2), 201-213.
30. Sachs, J. D., Schmidt-Traub, G., Mazzucato, M., Messner, D., Nakicenovic, N., & Rockström, J. (2019). Six transformations to achieve the sustainable development goals. *Nature sustainability*, *2*(9), 805-814.
31. Nguyen, T. D. M., Mondal, S. R., & Das, S. (2022). Digital Entrepreunerial Transformation (DET) Powered by New Normal Sustainable Developmental Goals (n-SDGs): Elixir for Growth of Country's Economy. In Sustainable Development and Innovation of Digital Enterprises for Living with COVID-19 (pp. 69-84). Springer Nature Singapore.
32. Iyengar, R., Mahal, A. R., Felicia, U. N. I., Aliyu, B., & Karim, A. (2015). Federal policy to local level decision-making: Data driven education planning in Nigeria. International Education Journal: Comparative Perspectives, 14(3), 76-93.
33. Alnsour, J. (2016). Managing urban growth in the city of Amman, Jordan. Cities, 50, 93-99.
34. Jarrar, N., & Jaradat, S. (2022). The de-industrialisation discourse and the loss of modern industrial heritage in the Arab world: Jordan as a case study. Journal of Cultural Heritage Management and Sustainable Development.
35. Al-Dalal'a, J. (2023). Fight or Flight: The Many Ways of Tactical Participation Agency in Amman, Jordan. Repurposing Places, 153.
36. Abu Murad, M. S., & Alshyab, N. (2019). Political instability and its impact on economic growth: the case of Jordan. *International Journal of Development Issues*, *18*(3), 366-380.
37. Awawdeh, M. M., Abuhadba, R. R., Jamhawi, M. M., Rawashdeh, A. I., Jawarneh, R. N., & Awawdeh, M. M. (2024). Urban expansion in Greater Irbid Municipality, Jordan: the spatial patterns and the driving factors. *GeoJournal*, *89*(2), 43.
38. Doraï, K. (2018). Conflict and migration in the Middle East: Syrian refugees in Jordan and Lebanon. *Critical perspectives on migration in the twenty-first century*, 113-126.
39. Abu Hajar, H. A., Al-Qaraleh, L. A., Moqbel, S. Y., & Alhawarat, A. M. (2021). Prospects of sustainable waste management in developing countries: A case study from Jordan. Environmental Monitoring and Assessment, 193, 1-14.

 doi:10.20944/preprints202408.1794.v1

40. Abdeljawad, N., & Nagy, I. (2023). Thirty years of urban expansion in Amman city: urban sprawl drivers, environmental impact and its implications on sustainable urban development: A review Article. Res Militaris, 13(1), 1230-1250.
41. Abdeljawad, N., Adedokun, V., & Nagy, I. (2023). Environmental Impacts Of Urban Sprawl Using Remote Sensing Indices: A Case Study Of Amman City–The Capital Of Jordan. GeoJournal of Tourism and Geosites, 46(1), 304-314.
42. Abdeljawad, N., & Nagy, I. (2023). Thirty years of urban expansion in Amman city: urban sprawl drivers, environmental impact and its implications on sustainable urban development: A review Article. Res Militaris, 13(1), 1230-1250.
43. Steele, W., & Rickards, L. (2022). Sustainable Development Goals and Urban Policy Innovation. In: Brears, R.C. (eds) The Palgrave Encyclopedia of Urban and Regional Futures. Palgrave Macmillan, Cham. https://doi.org/10.1007/978-3-030-87745-3_16.
44. Ali, H. H., & Al Nsairat, S. F. (2009). Developing a green building assessment tool for developing countries–Case of Jordan. Building and environment, 44(5), 1053-1064.
45. World Health Organization. (2021). Country cooperation strategy for WHO and Jordan 2021–2025.
46. Dombrowsky, I. (2022). Implementing the 2030 agenda under resource scarcity: The case of WEF nexus governance in azraq/Jordan. In *Governing the Interlinkages between the SDGs* (pp. 124-139). Routledge.
47. Alomari, F., & Khataybeh, A. (2021). Understanding of sustainable development goals: The case for Yarmouk University Science students in Jordan. *Pegem Journal of Education and Instruction*, *11*(2), 43-51.
48. Anselmi, D., D'Adamo, I., Gastaldi, M., & Lombardi, G. V. (2023). A comparison of economic, environmental and social performance of European countries: a sustainable development goal index. Environment, Development and Sustainability, 1-25.
49. Bani Salameh, M. T., & Aldabbas, K. M. (2023). Electoral districts' distribution in Jordan: Political geographical analysis. Asian Journal of Comparative Politics, 20578911231173599.
50. Cervigni, R., & Naber, H. (2010). Achieving sustainable development in Jordan: country environmental analysis.
51. Badrakhan, S. S. E., Mbaydeen, M. A., & Ogilat, O. (2022). The role private universities play in achieving academic, research, political, and economic sustainability in light of national strategy "Jordan's vision 2025" from the perspective of academicians. *Sustainable Futures*, *4*, 100080.
52. Ministry of Planning and International Cooperation. (2015). Jordan 2025: A National Vision and Strategy. Retrieved from https://www.mop.gov.jo/DetailsPage/Strategies (Accessed: 22 July 2024).
53. Ministry of Planning and International Cooperation. (2021). Jordan's Progress on Sustainable Development Goals (SDGs). Retrieved from https://mop.gov.jo/DetailsPage/SDGs (Accessed: 22 July 2024).
54. United Nations. (2017). **Jordan's Voluntary National Review 2017 on the Implementation of the 2030 Agenda**. Retrieved July 21, 2024, from https://sustainabledevelopment.un.org/content/documents/16289Jordan.pdf.
55. Ababsa, M. (2019). *Jordan National Urban Policy. Diagnostic Report* (Doctoral dissertation, Ifpo-Institut français du Proche-Orient).
56. Hajar, H. A. A., Tweissi, A., Hajar, Y. A. A., Al-Weshah, R., Shatanawi, K. M., Imam, R., ... & Hajer, M. A. A. (2020). Assessment of the municipal solid waste management sector development in Jordan towards green growth by sustainability window analysis. Journal of Cleaner Production, 258, 120539.
57. Abu Hajar, H. A., Al-Qaraleh, L. A., Moqbel, S. Y., & Alhawarat, A. M. (2021). Prospects of sustainable waste management in developing countries: A case study from Jordan. *Environmental monitoring and assessment*, *193*, 1-14.
58. United Nations Development Programme (UNDP), United Nations Human Settlements Programme (UN-Habitat), and Global Taskforce of Local and Regional Governments. *Roadmap for Localizing the SDGs*. United Nations, 2016. Available at: https://sustainabledevelopment.un.org/content/documents/commitments/818_11195_commitment_ROADMAP%20LOCALIZING%20SDGS.pdf.
59. United Nations Development Programme (UNDP). *Donors' Mapping Report*. 2018. Available at: https://www.undp.org/jordan/publications/donors-mapping-report.
60. Qahwaji, Y. "Development Priorities in Jordan: Who Decides on What?" *WANA Institute*. 2017. Available at: https://wanainstitute.org/en/blog/development-priorities-jordan-who-decides-what.
61. Jawarneh, R. N. (2021). Modeling past, present, and future urban growth impacts on primary agricultural land in Greater Irbid Municipality, Jordan using SLEUTH (1972–2050). ISPRS International Journal of Geo-Information, 10(4), 212.
62. Keswani, M. (2021). Exploring an integrated pathway for sustainable urban development of refugee camp cities and informal settlements. WIT Transactions on Ecology and the Environment, 253, 37-50.
63. Klassert, C., Gawel, E., Sigel, K., & Klauer, B. (2018). Sustainable transformation of urban water infrastructure in Amman, Jordan–meeting residential water demand in the face of deficient public supply

 doi:10.20944/preprints202408.1794.v1

and alternative private water markets. Urban Transformations: Sustainable Urban Development through Resource Efficiency, Quality of Life and Resilience, 93-115.
64. Alnsour, M. A. (2024). An Integrated Goal Programming Model Applied for Planning a National Policy of Sustainable Development: A Case of Jordan. *Process Integration and Optimization for Sustainability*, 1-27.
65. Benito, B., Guillamón, M. D., & Ríos, A. M. (2023). What factors make a municipality more involved in meeting the Sustainable Development Goals? Empirical evidence. *Environment, Development and Sustainability*, 1-24.
66. Joint SDG Fund. "Building Blocks to Finance the SDGs in Jordan." *Joint SDG Fund*, October 30, 2023. Available at: https://jointsdgfund.org/article/building-blocks-finance-sdgs-jordan.
67. Ministry of Planning and International Cooperation 2016: "Implementing the 2030 Agenda Through Policy Innovation and Integration".
68. UN-Habitat. Guidelines for Voluntary Local Reviews Volume 1: A Comparative Analysis of Existing VLRs. 2020. Available at: https://unhabitat.org/sites/default/files/2022/10/amman_vlr_-english_version-complete-out_for_print-_in_spreads_4.pdf.
69. United Cities and Local Governments (UCLG). *Guidelines for Voluntary Local Reviews Volume 2: Towards a New Generation of VLRs: Exploring the Local-National Link*. 2022. Available at: https://learning.uclg.org/guidelines-for-voluntary-local-reviews.
70. United Nations in Jordan. "Sustainable Development Goals | United Nations in Jordan." *United Nations*, 2024. Available at: https://jordan.un.org/en/sdgs (The United Nations in Jordan).
71. Bardach, E., & Patashnik, E. M. (2019). A Practical Guide for Policy Analysis: The Eightfold Path to More Effective Problem Solving. http://www.gbv.de/dms/sub-hamburg/30636509X.pdf.
72. Nazzal, M. (2005). Economic reform in Jordan: an analysis of structural adjustment and qualified industrial zones. Available at: http://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.554.3433&rep=rep1&type=pdf
73. Ndevu, Z., & Muller, K. (2017). A conceptual framework for improving service delivery at local government in South Africa. African Journal of Public Affairs, 9(7), 13-24.
74. Mohieldin, M., Wahba, S., Gonzalez-Perez, M. A., & Shehata, M. (2022). The Role of Local and Regional Governments in the SDGs: The Localization Agenda. In *Business, Government and the SDGs: The Role of Public-Private Engagement in Building a Sustainable Future* (pp. 105-137). Cham: Springer International Publishing.
75. Ben Hassen, T., & El Bilali, H. (2022). Sustainable Development Goals in the Middle East and North Africa (MENA) region: policy and governance. In *SDGs in Africa and the Middle East Region* (pp. 1-16). Cham: Springer International Publishing.
76. AidData. *Cutting across contexts: Better evidence to link the SDGs with national planning*. AidData, 2022. Available at: https://www.aiddata.org/blog/cutting-across-contexts-better-evidence-to-link-the-sdgs-with-national-planning.
77. Arab Renaissance for Democracy and Development (ARDD). *Civil Society Challenges in SDG Localization*. ARDD, 2022. Available at: https://www.ardd.org/publications/civil-society-challenges-in-sdg-localization.
78. Northrop, E., Biru, H., Lima, S., Bouye, M., & Song, R. (2016). Examining the alignment between the intended nationally determined contributions and sustainable development goals. World Resources Institute.
79. Ortiz-Moya, F., Tan, Z., & Kataoka, Y. (2023). Follow-Up And Review Of The 2030 Agenda At The Local Level.
80. Examining the alignment between the intended nationally determined contributions and sustainable development goals.
81. Raub, S. P., & Martin-Rios, C. (2019). "Think sustainable, act local"–a stakeholder-filter-model for translating SDGs into sustainability initiatives with local impact. International Journal of Contemporary Hospitality Management, 31(6), 2428-2447.
82. Potter, R. B., Darmame, K., Barham, N., & Nortcliff, S. (2009). "Ever-growing Amman", Jordan: urban expansion, social polarisation and contemporary urban planning issues. Habitat International, 33(1), 81-92.
83. Potter, R. B., Darmame, K., Barham, N., Nortcliff, S., & Mannion, A. M. (2007). An introduction to the urban geography of Amman, Jordan. *Reading Geographical Papers*, *182*, 1-29.
84. Jalouqa, K. (2015). Amman, from Village to Metropolis. Transformation of the urban character of Arab Cities since the late last century, 23, 23.
85. Gharaibeh, A. A., Al. Zu'bi, E. A. M., & Abuhassan, L. B. (2019). Amman (City of Waters); Policy, land use, and character changes. *Land*, *8*(12), 195.
86. Pilder, A. D. (2011). Urbanization and identity: The building of Amman in the twentieth century (Master's thesis, Miami University).
87. Aldabbas, A. H. M., & Atiyat, A. D. I. (2016). The impact of population migrations in contemporary Amman city architecture. *Arts and Design Stud*, *49*, 66-75.

 doi:10.20944/preprints202408.1794.v1

88. Aljafari, M. (2014). Emerging public spaces in the City of Amman, Jordan: An analysis of everyday life practices (Doctoral dissertation, Universitätsbibliothek Dortmund).
89. Alnsour, J. A. (2016). Managing urban growth in the city of Amman, Jordan. *Cities*, *50*, 93-99.
90. Shamout, S., Boarin, P., & Wilkinson, S. (2021). The shift from sustainability to resilience as a driver for policy change: A policy analysis for more resilient and sustainable cities in Jordan. Sustainable Production and Consumption, 25, 285-298.
91. Sharaf, F. M. (2023). Assessment of Urban Sustainability—The Case of Amman City in Jordan. Sustainability, 15(7), 5875.
92. Sharaf, F. M., Çinar, H. S., & Irmeili, G. A. (2023). Quality Evaluation of Public Pedestrian Spaces: The Case of Abdali Development in Amman City, Jordan. Civil Engineering and Architecture, 11(5).
93. Daher, R. F. (2008). Amman: Disguised genealogy and recent urban restructuring and neoliberal threats. In *The Evolving Arab City* (pp. 51-82). Routledge.
94. Al Rabady, R., & Abu-Khafajah, S. (2015). 'Send in the clown': Re-inventing Jordan's downtowns in space and time, case of Amman. *Urban Design International*, *20*, 1-11.
95. Kamal, O. (2020). Temporary space in Amman: a co-creation of everyday activism and state flexibility (Doctoral dissertation, Newcastle University).
96. Tawakkol, L. (2023). Capitalizing on crises: the EBRD, Jordanian state and joint infrastructure fixes. Review of International Political Economy, 1-25.
97. Zeadat, Z. F. (2018). A critical institutionalist analysis of youth participation in Jordan's spatial planning the case of Amman 2025 (Doctoral dissertation, Heriot-Watt University).
98. Radaideh, M. (2023). Environment Ministry launches 2023-2025 strategy. *Jordan Times*. Retrieved from https://www.jordantimes.com (Jordan Times).
99. City of Amman. (2019). *Amman Resilience Strategy*. Resilient Cities Network. Retrieved from https://resilientcitiesnetwork.org/downloadable_resources/Network/Amman-Resilience-Strategy-English.pdf.
100. Twayej, H., & Al-Nasrawy, A. (2023, April). The decentralization and its impact on achieving sustainable development goals-A case study about Najaf governorate office. In AIP Conference Proceedings (Vol. 2776, No. 1). AIP Publishing.
101. Municipalities are instrumental in addressing local development challenges and delivering essential services to citizens.
102. Sibanda, M., Maleka, M., & Khalo, T. (2020). Dissecting the Role of Good Governance in Enhancing Service Delivery: A Case of Mnquma Municipality. *Academy of Strategic Management Journal*.
103. Zeadat, Z. F. (2023). Strategies toward Greater Youth Participation in Jordan's Urban Policymaking. Journal of Sustainable Real Estate, 15(1), 2204534.
104. Ladan, M. T. (2018). Achieving sustainable development goals through effective domestic laws and policies on environment and climate change. *Envtl. Pol'y & L.*, *48*, 42.
105. Meuleman, L. (2018). Metagovernance for sustainability: A framework for implementing the sustainable development goals. Routledge.
106. Caiado, R. G. G., Leal Filho, W., Quelhas, O. L. G., de Mattos Nascimento, D. L., & Ávila, L. V. (2018). A literature-based review on potentials and constraints in the implementation of the sustainable development goals. *Journal of cleaner production*, *198*, 1276-1288.
107. Reddy, P. S. (2016). Localising the sustainable development goals (SDGs): the role of local government in context.
108. Glass, L. M., & Newig, J. (2019). Governance for achieving the Sustainable Development Goals: How important are participation, policy coherence, reflexivity, adaptation and democratic institutions?. *Earth System Governance*, *2*, 100031..
109. Ricciardelli, A. (2023). Governance, local communities, and citizens participation. In *Global Encyclopedia of Public Administration, Public Policy, and Governance* (pp. 5977-5990). Cham: Springer International Publishing.
110. Zhang, X. Q. (2016). The trends, promises and challenges of urbanisation in the world. Habitat international, 54, 241-252.
111. Wells, E. C., Lehigh, G. R., & Vidmar, A. M. (2020). Stakeholder engagement for sustainable communities. *The Palgrave handbook of global sustainability*, 1-13.
112. Ansell, C., Sørensen, E., & Torfing, J. (2022). The key role of local governance in achieving the SDGs. In *Co-creation for sustainability: the UN SDGs and the power of local partnership* (pp. 9-22). Emerald Publishing Limited.
113. Glass, L. M., & Newig, J. (2019). Governance for achieving the Sustainable Development Goals: How important are participation, policy coherence, reflexivity, adaptation and democratic institutions?. *Earth System Governance*, *2*, 100031.

114. Meadowcroft, J. (2004). Participation and sustainable development: modes of citizen, community and organisational involvement. *Governance for sustainable development: The challenge of adapting form to function*, 162-190.
115. Archer, D. (2018). Community-led processes for inclusive urban development. In *Routledge handbook of urbanization in Southeast Asia* (pp. 459-468). Routledge.
116. Szetey, K., Moallemi, E. A., Ashton, E., Butcher, M., Sprunt, B., & Bryan, B. A. (2021). Participatory planning for local sustainability guided by the Sustainable Development Goals. *Ecology & Society*, *26*(3).
117. McCollum, D., Gomez Echeverri, L., Riahi, K., & Parkinson, S. (2017). SDG7: Ensure access to affordable, reliable, sustainable and modern energy for all. In D. J. Griggs, M. Nilsson, A.-S. Stevance, & D. McCollum (Eds.), *A guide to SDG interactions: from science to implementation* (pp. 127-173). International Council for Science, Paris. https://pure.iiasa.ac.at/id/eprint/14621. DOI: 10.24948/2017.01.
118. Karakaya, E., & Sriwannawit, P. (2015). Barriers to the adoption of photovoltaic systems: The state of the art. *Renewable and Sustainable Energy Reviews*, *49*, 60-66.
119. Chapin, F. S., Matson, P. A., Mooney, H. A., & Vitousek, P. M. (2002). Principles of terrestrial ecosystem ecology.
120. Foley, J. A., DeFries, R., Asner, G. P., Barford, C., Bonan, G., Carpenter, S. R., ... & Snyder, P. K. (2005). Global consequences of land use. *science*, *309*(5734), 570-574.
121. Foley, J. A., Ramankutty, N., Brauman, K. A., Cassidy, E. S., Gerber, J. S., Johnston, M., ... & Zaks, D. P. (2011). Solutions for a cultivated planet. *Nature*, *478*(7369), 337-342.
122. Albrechts, L. (2004). Strategic (spatial) planning reexamined. *Environment and Planning B: Planning and design*, *31*(5), 743-758.
123. Wolfram, M., Hölscher, K., & Jansen, D. (2019). Perspectives on urban transformation research: transformations in, of, and by cities. Urban Transformations. https://doi.org/10.1186/s42854-019-0004-4
124. Qin, Y. (2020). Urban flooding mitigation techniques: A systematic review and future studies. *Water*, *12*(12), 3579.
125. Al-Noaimi, M. A. (2020). SDG goal 6 monitoring in the Kingdom of Bahrain. *Desalination and Water Treatment*, *176*, 406-427.
126. Al-Jayyousi, O. R. (2003). Greywater reuse: towards sustainable water management. *Desalination*, *156*(1-3), 181-192.
127. Shanableh, A., Khalil, M. A., Abdallah, M., Darwish, N., Tayara, A., Mustafa, A., ... & Al Bardan, M. (2021). Assessment and reform of greywater reuse policies and practice: a case study from Sharjah, United Arab Emirates. *Water Policy*, *23*(2), 376-396.
128. Christova-Boal, D., Eden, R. E., & McFarlane, S. (1996). An investigation into greywater reuse for urban residential properties. *Desalination*, *106*(1-3), 391-397.
129. Chen, L., Chen, Z., Liu, Y., Lichtfouse, E., Jiang, Y., Hua, J., ... & Yap, P. S. (2024). Benefits and limitations of recycled water systems in the building sector: a review. *Environmental Chemistry Letters*, *22*(2), 785-814.
130. Khademi, H., Gabarrón, M., Abbaspour, A., Martínez-Martínez, S., Faz, A., & Acosta, J. A. (2019). Environmental impact assessment of industrial activities on heavy metals distribution in street dust and soil. *Chemosphere*, *217*, 695-705.
131. Joseph, K., Eslamian, S., Ostad-Ali-Askari, K., Nekooei, M., Talebmorad, H., & Hasantabar-Amiri, A. (2019). Environmental Impact Assessment as a tool for sustainable development. *Encyclopedia of Sustainability in Higher Education*, 588-596.
132. NEP. (2005). Environmental Impact Assessment and Strategic Environmental Assessment: Towards an Integrated Approach. United Nations Environment Programme. Retrieved from https://www.unep.org/resources/report/environmental-impact-assessment-and-strategic-environmental-assessment-towards.
133. Vujovic, S., Haddad, B., Karaky, H., Sebaibi, N., & Boutouil, M. (2021). Urban heat island: Causes, consequences, and mitigation measures with emphasis on reflective and permeable pavements. *CivilEng*, *2*(2), 459-484.
134. Akpınar, M. V., & Sevin, S. (2018). Urban heat island effects of concrete road and asphalt pavement roads. *The Role of Exergy in Energy and the Environment*, 51-59.
135. Zhao, H., He, H., Wang, J., Bai, C., & Zhang, C. (2018). Vegetation restoration and its environmental effects on the Loess Plateau. *Sustainability*, *10*(12), 4676.
136. Zeadat, Z. F. (2022). Urban green infrastructure in Jordan: A perceptive of hurdles and challenges. *Journal of Sustainable Real Estate*, *14*(1), 21-41.

 doi:10.20944/preprints202408.1794.v1

137. Munaro, M. R., & Tavares, S. F. (2021). Materials passport's review: challenges and opportunities toward a circular economy building sector. *Built Environment Project and Asset Management*, *11*(4), 767-782.
138. Hoosain, M. S., Paul, B. S., Raza, S. M., & Ramakrishna, S. (2021). Material passports and circular economy. *An introduction to circular economy*, 131-158.