

A Holistic Approach to Regenerative Development: The Case of Outdoor Spaces in Higher Educational Contexts

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Abstract

Sustainable development for cities is insufficient for making crucial developmental changes within the current challenges and climate crisis. This research proposes a regenerative approach as a holistic strategy for development. The main objective of this paper is to propose a new approach for enhancing outdoor spaces at the MSA campus, with an emphasis on the utilization of essential components to begin the transition from a sustainability-focused to a thriveable mindset. This objective is pursued through a two-part methodology. In order to determine leverage points for regenerative development (RD), the first part includes a literature review, an investigation of a selected MSA outdoor space, and evaluation criteria for RD. The second part presents a developmental framework consisting of three key levels. The first level involves MSA campus initiatives that implement the SPIRALS framework. The second level clarifies sustainable campus landscape. The third level presents a proposal of an elementary design of the selected MSA university outdoor space enhancing users' mindsets and behavior. The results of this study demonstrate the benefits of using a regenerative development strategy in the planning of outdoor areas in educational settings.

Keywords: Development, Regenerative Principles, Sustainable Landscape, Strategies, Educational Institutions.

1 Introduction

Regenerative development goes beyond limiting damage and preserving the status quo by emphasizing the ideas of community and ecological restoration, rejuvenation, and revitalization. This approach is more holistic as it constantly integrates the communities' well-being, the health of the environment and the economy indicating that all are interconnected. Incorporating this approach in developing outdoor spaces helps in creating functional, beautiful and ecological spaces. Regenerative outdoor spaces in university campuses provide an opportunity for sustainable practices and education. This paper aims to propose a new approach for developing and improving a selected outdoor space at MSA University campus. This is accomplished by using a two-fold methodology. The first starts with an overview of the literature on regenerative development, regenerative landscape design, and outdoor areas in higher education. The current condition of the selected outdoor space in MSA University is investigated, and the evaluation criteria for RD are identified. Secondly, a development framework is proposed. This framework comprises three levels; the initiatives using SPIRALS framework, clarifying the sustainable landscape and proposing an elementary design of the selected outdoor space at MSA University campus.

2 Literature review

A brief historical background of the regenerative development is presented and the regenerative developmental approach is overviewed. The regenerative development for outdoor spaces are highlighted and outdoor spaces in higher educational contexts are clarified.

2. 1 Brief historical background of the regenerative development and approaches

The early foundations of this subject appeared in the 1880s by E. Howard who wrote "Tomorrow: A Peaceful Path of Social Reform" and reissued it in 1902. His book was an early expression of ecological thinking applied to human settlements, connecting humans to nature to build the health of the system [1]. Geddes in 1915 studied the urban growth patterns simulated by mass movement of people into cities [2]. In 1915, A. Tansley brought a new concept to ecology, "The Use and Abuse of Vegetational Concept and terms," which addressed the development of ecosystem concepts and ecological perspectives [3]. The idea became a framework for sustainable urban planning and development after being further refined to incorporate a social complex (human social institutions and behaviours) [4, 5].

In the 1950s and 1960s, Eugene and Howard Odum laid the groundwork for ecology's growth into a contemporary science based on the idea that the ecosystem is nature's basic ordering structure [6]. In 1968, L. Bertalanffy published his comprehensive system theory, which laid new groundwork for systems theory and systems thinking. In addition to introducing ideas centred on change, growth, and development, this theory highlighted the distinctions between biological and physical systems [7]. As a developmental method for intentionally enhancing systems thinking ability, Krone created living systems thinking in the 1960s and 1970s. His goal was to foster a mutually beneficial relationship between the industrial community and natural processes by fostering a knowledge of corporations, communities, and nature as living systems. Beginning in the 1990s, his work provided a fundamental basis for creating and utilizing regenerative development technologies and procedures [8, 9].

In 1969, McHarg IL published "Design with Nature," a groundbreaking technique for ecological land use based on an understanding of natural systems, with ecological sustainability as the cornerstone of regenerative development and design [10]. The Geographic Information System, a vital instrument for ecological development, was developed in part because to his book. Permaculture is an ecological design system that was created in 1978 by B. Hollison and D. Holmgren to support the design of human habitats [11]. The term "regenerative" was originally used in reference to land usage by R. Rodale in the 1980s [12]. Using this word, he explained that the foundation of health is the ongoing biological renewal of the complex living system. He related regenerative economic development to the same idea of continuous self-renewal [13]. In 1984, J. T. Lyle stated in his book "Design of Human Ecosystems" that in order to produce long-lasting, ethical, and useful designs, designers need to comprehend natural order functioning at several scales and connect this knowledge to human values [14]. The period of the 1990s was rich with different ideas for ecological design thinking. In 1994 J.T. Lyle published "Regenerative Design for Sustainable Development," the first guidebook on regenerative design [15]. This manual is regarded as a useful reference for regenerative system theory and design. It offered a framework and technological design techniques for reversing environmental damage that may be caused by industrial land use practices.

2.2 Regenerative developmental approach

The regenerative developmental approach is a thorough and effective approach to developmental methods. The concepts of regenerative design and development are obviously rooted in ecological sustainability that calls for the maintenance of the integrity and health of natural systems as the foundation for continued human sustainability [16]. Both human and non-human life must continue to evolve for sustainability, and human activity must coexist peacefully with natural systems [17]. Regenerative design has been used in practice for more than 20 years, although theoretical debates and research have just lately begun to take notice of it. [16,18,19, 20, 21, 22].

In the past, the main goals of "green building" were to "do less harm" by reducing the degenerative consequences of human activity on natural systems' integrity and human health [23]. Cole criticized these strategies, saying that the concept of "green building" is both essential for creating an environmentally sustainable future and an unfulfilled goal for encouraging and pushing designers and their clients to be more creative. The idea of place and how humans fit into it is central to regenerative development. It

promotes a co-evolutionary, partnered interaction between humans and natural systems rather than a managerial relationship, which raises rather than lowers the social and natural capitals required to "grow the caring" necessary to make sustainability a reality [16].

Regenerative development (RD) is a place-based development that goes beyond sustainability by dynamically enhancing the capacity of living systems to regenerate and thrive. Its main goal is to restore and improve the social and ecological systems that sustain life, allowing them to become more resilient, diverse, and complex. RD seeks to create habitats that enhance ecosystems, communities, and economies by encouraging a closer relationship between ecological processes and human activity. This method demonstrates how these systems may change and adapt over time, ensuring that they will continue to offer opportunities and vital resources to coming generations. Regenerative development seeks to create spaces that promote health, well-being, and a thriving natural world by inspiring innovation and flexibility, ensuring that both natural and human systems can regenerate, sustain themselves, and flourish in the face of ongoing challenges and change [22].

2.3 Regenerative development for/in outdoor spaces

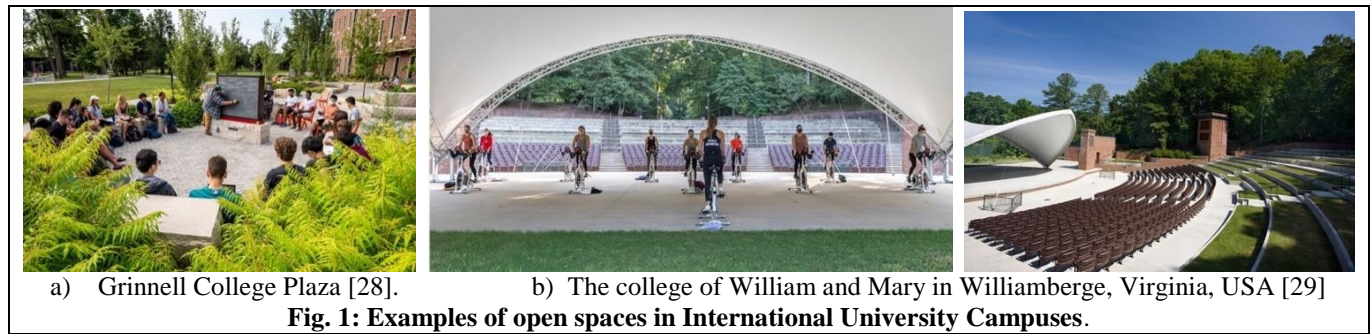
Regenerative landscape design (RLD), and development for outdoor spaces aim at resolving the multiple problems of urban areas to improve their quality of life. Urban space can provide useful effects on human health. The concept of RLD is an emerging new approach that enhances socio-environmental sustainability. It includes three objectives: developing the positive change capacity (regenerative); grounding solutions interlinked with spatial patterns and processes (landscape); and ensuring iterative processes of co-design (design) and co-discovering that is coupled to material solutions.

Landscapes are created to achieve the spatial and temporal interconnections of social-ecological processes in order to produce regenerative landscape systems. RLD is defined as a method for finding pattern-based solutions that prioritizes cooperative, interactive, and assisted involvement in order to co-produce locally relevant knowledge for desirable landscape management [24]. When integrating the following three components—design, landscape, and regenerative—interactive co-design and co-creation should incorporate a transdisciplinary approach to address a variety of challenges. The co-design approach identifies the pertinent players as well as common values and goals about landscape design. When regenerative systems search for the most desirable system states, they highlight an established consensus of what might be most valued and desired among the various outcomes.

2.4 Outdoor spaces in higher educational contexts

Open spaces on campus are outdoor areas that connect different university buildings. These spaces are designed to serve students and staff members and can accommodate a variety of activities, including studying, socializing, eating, resting during break for mental refreshment and enjoying nature and green spaces. They can also host other recreational events and sports activities. Open spaces have positive impact on users' mental, physical and psychological health leading to improvements in behavioral skills, self-confidence and performance during classes. Well-designed open spaces enhance the campus's visual appeal creating attractive environment. This leaves a positive lasting impression on students' memories causing a significant impact on their feelings about the overall educational experience [25]. Outdoor spaces can function as informal study areas, allowing students to learn in a more relaxed and inspiring environment. They provide a setting for informal meetings and group projects enhancing creativity and teamwork among students and faculty members. They are attractive places for students from different colleges and staff members to interact encouraging social and cultural connections. They also improve mental well-being through exposure to green spaces providing tranquil environment [26] reducing stress, enhancing mood and mitigating negative feelings of stressful routine studying [27]. They encourage physical and sport activities promoting a healthier lifestyle. These areas can host various cultural and recreational events, festivals, and

different performances enriching campus life. Figure 1 offers an illustrative example of how renovation projects including outdoor spaces serve many beneficial purposes.



Users have multiple uses due to the hierarchy of open areas. On college campuses, open areas could be categorized based on various uses. Every activity requires a different approach in terms of the space's dimensions, landscape, furnishings, location, and its accessibility on campus [30].

3. Evaluation criteria for regenerative development

Table 1 shows the evaluation criteria for open spaces classified into different typologies. Open spaces are assessed according to the RLD and health determinants. The RLD includes the positive change capacity (regenerative), solutions interlinked with spatial patterns and iterative processes of co-design. The health determinants of open spaces are categorized into places attachment, psychological, social and physiological aspects. This table is used for assessing the selected open space in MSA University.

Table 1: Evaluation table: University Campus Open spaces, Regenerative Landscape Design and Health Determinants of Open Spaces (Adapted from [31]&[32])

Types of Open Spaces in University Campus Layout			Regenerative Landscape Design (RLD)			Health Determinants of Open Spaces			
			Regenerative	Landscape	Design	Place Attachment	Psychological Aspects	Social Aspects	Physiological Aspects
Activity	Active Recreation	Eating, Drinking							
		Social Interaction							
		Sports Activity							
	Passive Recreation	Relaxation							
	Outdoor Study Area								
Open Space Size	Small Gathering Spaces								
	Large Gathering Spaces								
Building Form	Spaces formed by buildings								
	Building's forcourts								
Spiritual Aspects	Symbolic Space								
	Discovered Space								

4. Selecting an outdoor space at MSA University as a case study

The anxiety and stress brought on by the physical and environmental surroundings generally cause people in today's society, and users of educational facilities in particular, to lose focus. Educational building designers has to find a strategy to lessen these harmful impacts on students. In this study, an open space at

MSA University campus was selected as a pilot project to illustrate how regenerative development can address these challenges (Figure 2). This space was chosen due to its prime centralized location and its potential for transformation into a health-promoting environment. Focusing on a small, defined area allows for detailed observation, precise interventions, and measurable outcomes, creating a scalable model for future development. The chosen outdoor area's current state at MSA University is examined and assessed using RLD and health variables. As a result, leverage points for development are identified.

4.1 Current conditions of the case study

The chosen location is close to two-story educational buildings (Figure 3). The functional zones, as well as the natural and physical components, are taken into consideration when analyzing the space, as follows.

4.1.1 Functional zones

With its different range of facilities and open spaces, this area is considered as the main social hub and recreational area at MSA campus (Figure 4). The open spaces are designed to encourage social interaction where shaded seating areas are located for students to rest and have lunch. A variety of stores, including cafes and food outlets fulfill their daily needs. Adjacent to these facilities are sports courts that encourage students' physical activity. Additionally, the presence of medical services ensures a sense of safety and well-being for students.

4.1.2 Physical elements

The physical elements of the selected open space are analyzed through illustrating the flooring type, roofing systems, shading devices, furniture varieties, and complementary features (such as recycling bins and lighting objects). Various kinds of appropriate tiles are used to finish the outdoor flooring area. Steel structures of various sizes and shapes cover a portion of the area. Every piece of furniture is a permanent steel-wood table and bench (Figure 5).



General layout

Fig. 2: Part of MSA University campus. (Source: Google Earth, 1.10.2024).



Study area.

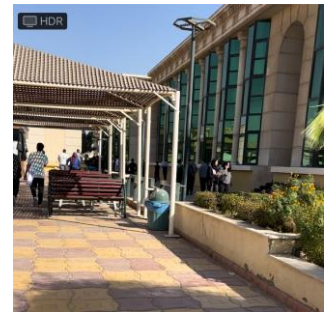


Fig. 3: Educational buildings facing the study area.



Fig. 4: Functional zones in the study area.



Fig. 5: Study area's physical features



4.1.3 Natural Elements

Part of the green area is situated at the edge of the space and not integrated with the students' different activities. Additionally, there are only some shrubs and few palm trees in the center of the space (Figure 6). The limited greenery in this open space area fails to create a pleasant comfortable microclimate for students' and staff relaxation. The design of the space does not integrate the green elements with the variety of activities and functions in the space.

4.2 Monitoring student's behaviour and activity in the space

During lecture breaks, the area is primarily intended for staff and students to unwind and mingle while eating lunch. Students can occasionally be seen conversing or studying. Others may enjoy playing paddle tennis. It is typically seen to be overcrowded and noisy because it is the only major recreational place on the entire university campus (Figure 7). The area's intended function as a restorative setting is weakened by the high noise level caused by the high user density.

4.3 Evaluating the selected open space

The authors' surveys and observations of the chosen open area are assessed using assessment tables 2 and 3. Table 2 shows that the majority of the active and passive recreational activities are below expectations. When evaluating social interaction in terms of regenerative aspects, for instance, the positive change capacity is not met because of the large hangers covering the numerous fixed outdoor furniture pieces, which restrict the flexibility of seating areas and create a noisy environment during breaktime.



Fig. 6: Natural features.

Fig. 7: Students' activities and behavior.

The landscape and the grounding solutions interlinked with spatial patterns and processes in the selected open space are not well achieved, since the greenery is not integrated with the different activities. The health determinants of the open space show that incorporating physical movement into the eating activity is well achieved as the food kiosks are distributed along a path that encourages students to walk. However, the open space does not fully support physiological well-being. It lacks serenity, water elements and sufficient greenery.

4.4 Identifying leverage points for development

Points of power are regarded as leverage points. Leverage points should be discovered in order to implement long-lasting reforms. Leverage points are places with complex systems where a small change in one aspect can create large changes in everything [33]. Identifying leverage points for development of outdoor space on a university campus involves diverse strategy. It will be effective to incorporate interactive co-design and co-creation principles if the three primary components—regenerative, landscape, and design—are integrated to address contemporary challenges. This strategy can be applied by understanding bottom-up interrelation in the co-design processes. Moreover, the users' shared values and objectives about landscape design are identified. Students and staff can share their insights on how they are currently using outdoor spaces and ways for improvement that could be achieved through community workshops. Design competitions will challenge the actual users to design innovative proposals and encourage wide range of

concepts and ideas while promoting the sense of ownership among them. Feedback loops through digital platforms will help in gathering user's insights and develop outdoor spaces. This could be considered as a valuable learning opportunity for students to learn regenerative design principles in real-world applications. Integrating landscape ecology helps in enhancing biodiversity and ecological integration. A new design can be created to connect and link together outdoor spaces across the campus by mapping ecological corridors and identifying existing flora and fauna on campus. It can incorporate features that manage surface water flow and enhance water quality and the natural hydrological processes.

Table 2: The Evaluation of the selected open space in MSA University Campus according to Regenerative Landscape Design and Health Determinants of Open Spaces

Types of Open Spaces in University Campus Layout			Regenerative Landscape Design (RLD)								
			Regenerative			Landscape			Design		
			Below Expectations	Meet Expectations	Exceed Expectations	B.E	M.E	E.E	B.E	M.E	E.E
Activity	Active Recreation	Social Interaction	✓			✓			✓		
		Having Lunch	✓			✓			✓		
		Sports Activity		✓		✓				✓	
	Passive Recreation	Relaxation	✓			✓			✓		
		Outdoor Study Area	✓			✓			✓		
Open Space Size	Small Gathering Space										
	Large Gathering Space		✓			✓			✓		
Building Form	Spaces formed by buildings			✓		✓					
	Building's forcourts										

Table 3: The Evaluation of the selected open space in MSA University Campus according to Health Determinants of Open Spaces

Types of Open Spaces in University Campus Layout			Health Determinants of Open Spaces											
			Place Attachment			Psychological Aspects			Social Aspects			Physiological Aspects		
			Below Expectations	Meet Expectations	Exceed Expectations	B.E	M.E	E.E	B.E	M.E	E.E	B.E	M.E	E.E
Activity	Active Recreation	Social Interaction		✓		✓				✓		✓		
		Having Lunch		✓		✓				✓		✓		
		Sports Activity	✓				✓			✓			✓	
	Passive Recreation	Relaxation	✓			✓			✓			✓		
	Outdoor Study Area		✓			✓			✓			✓		
Open Space Size	Small Gathering Space													
	Large Gathering Space		✓			✓				✓		✓		
Building Form	Spaces formed by buildings			✓		✓				✓		✓		
	Building's forcourts													
Spiritual Aspects	Symbolic,Discovered Space		✓			✓			✓			✓		
	Discovered Space		✓			✓			✓			✓		

Emphasizing spatial resilience is achieved by considering micro and macro spatial scales. Small green gardens provide micro habitats which enhance biodiversity. Larger green spaces manage heat islands and carbon sequestration reducing climate change impacts. Multi-purpose spaces can be used for group activities, classes or quiet reflection enhancing social interaction. Regenerative design approaches will improve the mental well-being and physical health. Campus features like sensory gardens, outdoor workout and relaxation areas, and green spaces that are available for a variety of staff and student activities will enhance students' overall performance. Planting native species improves local biodiversity and requires less water while positively contributes to landscape ecology and supports local fauna.

5. Framework of development

The first part of the methodology is covered in the previous sections. The second part presents a developmental framework consisting of three key levels. The first level involves MSA campus initiatives that implement the SPIRALS framework. The second level clarifies the sustainable landscape. The third level proposes an elementary design of the selected outdoor space at MSA University campus.

5.1 Initiatives implementing SPIRALS framework

A shift from a "sustainable" to a "thriveable" mindset is required. The SPIRALS framework can serve as a roadmap for achieving this goal. Developing solutions that can enhance our quality of life while invigorating and reuniting us with all living things is the essence of thriveability. Edward's view [34] of the factors that can result in significant initiatives gave rise to the SPIRALS paradigm. Scalable, place-making, intergenerational, resilient, accessible, life-affirming, and self-care initiatives can be created and implemented with the SPIRALS strategy. Only the first two SPIRALS framework criteria are the subject of this paper. Scalable initiative can be achieved by launching an awareness campaign emphasizing the contribution of open spaces to community health and environmental sustainability. Sustainable habits, like native plants, can be promoted in open areas by using educational initiatives and signages. Mentality shift can be spread via the exchange of best practices and instructional materials by collaborating with regional administrations, non-governmental organizations or global environmental groups. A place-making initiative can be created for open spaces through artistic and cultural expressions. Local artists can make interactive art that relates to the common experiences of the campus community by incorporating the values and culture of the university into the design of public areas.

5.2 Sustainable campus landscape

Landscapes enhance ecosystem services and conservation of biodiversity. Native species conservation, rainfall collecting, and better water quality are just a few of the many advantages of sustainable landscapes. Landscape on campus can also be used for sustainable energy production. Community gardens on campus could be an integrated aspect of campus landscape sustainability through fruit and vegetable production. The campus landscape is considered as an open space which is restorative to health and well-being of students and staff. The biophysical landscape, which students might use as a living laboratory, is linked to the sustainable campus landscape. It offers experiential learning opportunities that are directed by the sustainability aims and values of the university. Ecological service, student engagement, recreation, health and well-being and sustainability awareness are promoted in the sustainable campus landscape. The sustainable landscape tackles the problem of loss of native landscapes and their replacement with gardens causing an 'extinction of experience' [35]. It disconnects students from native ecosystems that can not be replaced by any other greenspace forms. Students' associations with specific environments, including their features, such as particular plants and flowers, animal species, or water, boost their sense of place and spiritual enrichment [36]. A number of programs aim to restore students' connection to nature by bringing nature back into communities through initiatives that protect and enhance land nature. For example, turf grass lawns can be replaced with native flora.

5.3 Proposed elementary design of the selected outdoor space at MSA University campus

The proposed elementary design considers the human scale of the recreational and study zones which are integrated with the intense native flora and water features. It also takes into account RLD (Figure 8).



Fig. 8: Proposed RD designs for the selected open space at MSA University campus applying RD approach

6. Conclusion

Application of RD approach for outdoor spaces in educational context is recommended to enhance the benefits for their users and to ensure thriving. Although the open spaces at MSA University campus offer different useful services for users, it still needs further development. For this purpose RD approach is proposed for the redesign of a selected open space. Table 4 shows that the regenerative development approach is a step beyond the sustainable one as it is considered as a transformative approach. Rather than only providing the essentials, it serves as a comprehensive solution that creates systems contributing to a more thriving future for both people and the planet.

Table 4: Comparison between the sustainable and regenerative development

	Sustainable Development	Regenerative Development
Maintenance, and Improvement	Aims to reduce harm and maintain the status quo. It often focuses on minimizing resource consumption, emissions, and waste without significantly improving ecosystems or social systems	Focuses on actively improving and restoring ecosystems, enhancing biodiversity, and creating thriving communities.
Systems Thinking	Deals specific issues in isolation (eg. energy efficiency or carbon footprint reduction)	Considers interconnected systems (eg. social, economic, and ecological systems) Adopts a holistic approach
Feedback Loops	Aims to "do less harm," to the environment	Provides positive feedback loops (integrating human activities and natural ecological systems while enhancing the overall well-being).
Ecological Deficits	Does not actively rebuild natural systems or address the historical degradation of ecosystems	Actively repairs and replenishes degraded environments, fostering resilience.
Efficiency	Often prioritizes efficiency (e.g., energy, water use) as the primary metric of success	Balances efficiency with resilience, adaptability, and ecological growth.
Short-Term and Long-Term Focus	Can be implemented as short-term fixes focusing on immediate gains	Emphasizes long-term investments in cultural heritage, community health and ecosystem vitality
Cultural and Social Dimensions	Often emphasizes technical solutions (e.g., green technologies) and neglects cultural, social, and emotional connections to the environment	Actively integrates social equity, community involvement, and cultural identity into projects

References

- [1] J.T.Lyle. "Regenerative Design for Sustainable Development", John Wiley & Sons, Hoboken, (1994).
- [2] P.Geddes. "Cities in evolution", Williams & Norgate, London, (1915).

- [3] S. Trudgill. "Tansley, A.G. 1935: The use and abuse of vegetational concepts and terms", *Progress in Physical Geography Earth and Environment*, vol. 16, pp. 284-307, (2007).
- [4] P.J. Marcotullio, M. Leaf, S. Zandaryaa, N. Hassan. "Defining an Ecosystem Approach to Urban Management and Policy Development", United Nations *University Institute of Advanced Studies* (UNU/IAS), Yokohama, (2004).
- [5] S.T. Pickett, M. Grove. "Urban ecosystems: What would Tansley do?", *Urban Ecosystems*, (2009).
- [6] H.T. Odum. "Environment, Society and Power", Wiley-Interscience, New York, (1971).
- [7] V.L. Bertalanffy. "General System Theory: Foundations, Development, Applications", George Braziller, New York, (1968).
- [8] C. Sanford. "The Responsible Corporation: Reimagining Sustainability and Sustainability and Success", Josey-Bass, San Francisco, (2011).
- [9] J.T. Lyle. "Urban ecosystems: Cities of the future will embrace the ecology of the landscape, rather than set themselves apart", *Designing A Sustainable Future*, Vo. 35, p. 43, (1993).
- [10] I.L. McHarg. "Design with Nature," Doubleday, Garden City, New York, (1969).
- [11] B. Mollison. "Permaculture: A Designer's Manual," Tagari Publications, Australia, (1988).
- [12] P. Mang. "Regenerative Development regenerative development and Design", *Sustainable Built Environments*, p.62, (2013).
- [13] G. Medard, E. Pahl, R. Shegda. "Regenerating America: Meeting the Challenge of Building Local Economies," Rodale Press, Emmaus, PA, (1985).
- [14] J.T. Lyle. "Designing human ecosystems," John Wiley & Sons, Hoboken, (1984).
- [15] J.T. Lyle. "Regenerative design for sustainable development", John Wiley & Sons, Hoboken, (1994).
- [16] R.J. Cole. "Transitioning from green to regenerative design", *Building Research & Information*, vol. 40, pp. 49-53, (2012).
- [17] B. Reed. "Shifting from Sustainability to Regeneration", *Building Research & Information*, vol. 35, pp. 674-680, (2007).
- [18] C. Du Plessis. "Towards a regenerative paradigm for the built environment", *Building Research & Information*, vol. 40, pp. 7-22, (2012).
- [19] C. Du Plessis, P.S. Brandon. "An ecological worldview as basis for a regenerative sustainability paradigm for the built environment", *Journal of Cleaner Production*, vol. 109, pp. 53-61, (2015).
- [20] L.V. Gibbons, S.A. Cloutier, P.J. Coseo, A. Barakat. "Regenerative development as an integrative paradigm and methodology for landscape sustainability", *Sustainability*, vol. 10, (2018).
- [21] J. Robinson, R. Cole. "Theoretical underpinnings of regenerative sustainability", *Building Research & Information*, vol. 43, pp. 133-143, (2015).
- [22] L.V. Gibbons. "Regenerative—The New Sustainable?", *Sustainability*, vol. 12, (2020).
- [23] X. Zhang, A. Platten, L. Shen. "Green Property Development Practice in China: Costs and Barriers", *Building and Environment*, vol. 46, pp. 2153-2160, (2011).
- [24] E.A. Smithwick, J. Baka, D. Bird, C. Blaszcak-Boxe, C.A. Cole, J. D. Fuentes, S. E. Gergel, L.L. Glenna, C. Grady, C.A. Hunt, L. D. Iulo, J. Kaye and K. Keller "Regenerative landscape design: an integrative framework to enhance sustainability planning", *Ecology and Society*, vol. 28, (2023).
- [25] H. Hanan, H. "Open space as a meaningful place for students in ITB campus", *Procedia – Social and Behavioral Sciences*, vol. 85, pp. 308-317, (2013).
- [26] A.L. McFarland, T. Waliczek, and J.M. Zajicek. "The relationship between student use of campus green spaces and perceptions of quality of life", *HortTechnology*, vol. 18, pp. 232-238, (2008).
- [27] A. F. Alshimaa. "Assessment of user happiness in campus open spaces", *The Journal of Public Space*, vol. 4, (2019).
- [28] Kington Plaza and Christiansen Outdoor Learning Spaces, Ayers Saint Gross, Available: <https://ayerssaintgross.com/work/project/grinnell-college-plaza-and-outdoor-learning-spaces/>, (Accessed: October, 2024).
- [29] L. Garrett. "Colleges and Universities Should Invest in Outdoor Spaces", APPA Facilities Manager, <https://www.appa.org/facilities-manager/may-june-2021/colleges-and-universities-should-invest-in-outdoor-spaces/>, (Accessed: October, 2024).
- [30] A. Alhusban, S. Alhusban, Y. Al-Betawi. "The degree of the Hashemite University students desires, needs, and satisfaction with their campus urban design", *Journal of Place Management and Development*, vol. 12, pp. 408-448, (2019).
- [31] H. S. Mishra, S. Bell, P. Vassiljev, F. Kuhlmann, G. Niin, J. Grellier. "The development of a tool for assessing the environmental qualities of urban blue spaces", *Urban Forestry & Urban Greening* (2020).
- [32] N. Usama. "Humanizing Taibah University Campus Open Spaces in Madinah: Toward A Sustainable Environment for Walkability and Green Spaces", *Journal of Sustainability Science and Management*, vol. 16, pp. 236-257, (2021).
- [33] D. H. Meadows. "Leverage Points: Places to Intervene in a System", Sustainability Institute, (1999).
- [34] A. R. Edwards. "Thriving Beyond Sustainability: Pathways to a Resilient Society", New Society Publishers, (2010).
- [35] M. Garfinkel, A. Belaire, C. Whelan, E. Minor. "Wildlife gardening initiates a feedback loop to reverse the extinction of experience", *Biological Conservation*, vol. 289, (2024).
- [36] K. Fausey. "Ecosystem service values support conservation and sustainable land development: Perspectives from four University of California campuses", *Ecological Engineering*, vol. 208, (2024).