Review

Developing a Tool for Landscape Sustainability Assessment - Using a new conceptual approach in Lebanon

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Posted Date: 4 September 2023

doi: 10.20944/preprints202309.0066.v1

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Developing a Tool for Landscape Sustainability Assessment—Using a New Conceptual Approach in Lebanon

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Abstract: In the absence of a holistic view of Landscape Sustainability, credible data and consistent information are needed to help decision making and support adaptive landscape management. However, consolidated tools (system of standards and controls) of assessment exist, but show a complexity of the references on one hand, and are mostly qualitative and environmental indicators based on the other hand. Large sets of landscape indicators also exist and can be adopted, but it is crucial to select a new set of non-conventional indicators, that give a holistic view on the different landscape dimensions. This review article engages both environmental indicators and landscape indicators, relevant philosophies and the basic descriptions. Main models used, prerequisites and various fields of application are also taken into consideration. Various environmental and landscape indicators are presented and compared to identify the best reference to landscape sustainability, and on which scales they can be applied, most particularly in the case of Lebanese Landscapes that show a variability in characteristics, and present a unique visual identity and a genuine natural and built landscapes worthy conservation.

Keywords: landscape indicators; landscape sustainability; landscape assessment; weighting and aggregation

1. Introduction

The expression «Landscape» was considered in many disciplines as: environmental sciences, agroecological sciences, socioeconomical sciences, and territorial policies. It is multipurposed [1], thus many theories are applied. Forman and Gordon [2] considered it as an area, geographically wide and correlates with human perception, while the New Oxford American Dictionary defined landscape as the aesthetic appearance, the many visible structures of a territory.

Landscape has a unique value [3] and plays a vital role in one's health, economy and international reputation. However, it is impacted by Man [4] and shaped over millennia by his activities along with natural processes. Landscape is dynamic and in continuous change [5–7]. It is also a tool for integration [8].

The landscape plays a rudimentary role in, and reflects, the environmental, ecological, social and cultural aspects [9] affecting populations. At the same time, it is the result of how a population use and perceive the landscape [6,10]. Landscape develops interactively with human societies occupying it [11], so it became a necessity for everyone to claim their right and responsibility toward landscape protection, management and planning [9].

Landscape is crucial for the quality of life in both urbanscape and ruralscape, in degraded and in high quality scapes, in outstanding beauty scape and in everyday scape.

So «looking after landscape is no longer about preservation ... change can be positive if planned and managed well» [5]. Furthermore, landscape can (i) return broad commodities that are essential to humans like resources (as raw materials, wood or food), (ii) support climate regulation (iii) fulfil aesthetic, recreational and even educational prospects (iv) create conservation opportunities [12].

 doi:10.20944/preprints202309.0066.v1

But to fulfil landscape remit, we need to discuss all landscape facets, starting from Landscape policies, to landscape management planning, providing robust means of measuring sustainability outcomes of landscape, and Landscape assessment systems.

1.1. Landscape Policies and framework

In accordance with the awareness about natural resources, many innovations started to show at the landscape level. It became essential to integrate any agriculture activities, all environmental effects and the rural livelihood outcomes with the landscape [13]. Here arises the need to «Measure» the Landscape and identify actions, thus the need for Landscape policies.

Firstly, when it comes to protecting the landscape, actions are directed toward preserving the distinctive features of this landscape. Differently from when it comes to landscape planning actions, strong progressive actions are needed in this case, to improve, correct or even create landscapes. This is a turning point intended to integrate landscape into the local planning policies, and then into surrounding policies and regional planning.

In other words, policies and activities must take landscape values into account. In Europe for instance, two regulations represent landscape policies [9]: The European Landscape Convention (ELC) and the Strategic Environmental Assessment (SEA) Directive. They are meant to regulate any plan or program affecting territorial and landscape plans [14].

More recently, the article 5 of the 11th Council of the Europe (CoE) mentioned that landscapes should be recognized in the law as a drastic component of people's surroundings. Also, the article 6 entitled implementation of specific measures set out, can establish landscape policies beyond protection and aimed at landscape management and planning.

In the case of Portugal, the Law 80/2015 establishes the necessary measures when it comes to landscape heritage, and takes into account the transactions between private owners of rural areas.

In few words, landscape must be adopted in the territorial management system. it is a key to sustainable living environment and successful territorial policy, yet the role of regional and inter-municipal or municipal spatial plan must be considered on this matter. We recommend (i) the integration of the landscape in policies at both local and regional level, (ii) promoting the value of the landscape and most importantly, (iii) considering and incorporating the landscape in the natural resources and territory management.

Nevertheless, as landscapes are constantly changing, collecting information, identifying and evaluating landscapes can help monitor the evolution of landscapes and their role in the territorial dynamics. To do so, we must consider the different facets of the landscape and identify a method to assess the changing landscape.

1.2. Landscape facets

Landscape is where geography and ecology converge [15], an approach to spatial development [9], the quality of the surroundings of individuals and societies [15]. Landscapes have their own order, rhythm and temporality, different from human life cycles but in relation to them [16]. Landscape shows different dimensions, different themes, different facets. Facets of the landscape were examined by the CoE and some are briefed in Table 1. As per examination of the Council of Europe, landscape shows different facets. It can vary between spatial thinking, to collective spaces and cultural asset, or even awareness, educational and designed landscape.

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Table 1. Facets of the landscape.

	Facets of the landscape	Description	Referencing CoE expert
1.	Urban, suburban & peri-urban landscapes	where the city is considered through spatial thinking as a whole, and integration with the landscape will be held vertically and horizontally	Bruns D.
2.	Road landscapes	are collective spaces with a character of their own, hosting daily life and creating positive scenery through valuable landscapes	Echániz I.
3.	Tree-lined avenues in the landscape	are landscape feature and cultural asset meriting conservation, relevant to offering safety, improving the landscape and the avenue climate	Pradines C., Association «Trees and Roads»
4.	European local landscape circle studies	are analytical studies of 7-steps where groups or individuals can analyze their landscape and be aware of change in their landscape, and thus participate in the process	O'Regan T.
5.	Landscape and education for children	is education on general aspects of the landscape applied in primary and secondary schools	Castiglioni B.
6.	Training of landscape architects	recommendations on curricula and educational structures, combining natural and social sciences with skills in planning and landscape design	Sarlöv-Herlin I., European Council of Landscape Architecture Schools
7.	Landscapes and ethics	instrument for regulation of social relations, and protection rights in landscape management and preservation	Kuleshova M. & Semenova T.

We mentioned so far the different perceptions of landscape since it is impacted by the society, either directly or indirectly. We also mentioned the perpetual change in the landscape, that can sometimes lead to its degradation, and the need for considering landscape policies to properly improve the landscapes. Still, there is no holistic view of Landscapes nor their Sustainability.

Consolidated tools of assessment are needed to (i) help decision making and (ii) support adaptive landscape management. Yet, regardless of the complexity of the references, tools to assess the landscape do exist, but the existing tools are mostly qualitative and environmental indicators based.

We will describe and discuss in the below sections, the relevant philosophies about landscape sustainability and assessment, the main models, prerequisites and the various fields of application.

2. Materials and methods

We reviewed papers published in international scholarly & peer-reviewed publication indexed by USEK library search engine, from January 2012 to December 2022, with the focus on articles examining the use and development of landscape indicators, and how they can be weight and aggregated.

We considered a key term literature review and adopted «Landscape indicators», «Landscape Sustainability» and «Landscape assessment» from Sowińska-Świerkosz [17]. These key terms were allied by «or» to take account of all commonly used designations for landscape indicators, landscape indicators type and landscape indicators development. We also combined to our search, the term «tools» to end up with the following key search: «((«LANDSCAPE INDICATOR» OR «LANDSCAPE SUSTAINABILITY» OR «LANDSCAPE ASSESSMENT») AND («TOOLS»))».

This review was limited to disciplines as Agriculture, Architecture, Ecology, and Environmental Sciences. Most results were relevant to tool applied in land changes, environmental indicators and agriculture. While our aim was mainly on landscape indicators, their use, their development and participation in tools of assessment.

This methodology was adapted from Moher et al. [18] and described in Table 2. Only 171 articles were identified from the search. Each result was evaluated to compile recent literature and relevance to the use and development of landscape indicator, as a tool for landscape quality and sustainability.

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Accordingly, 110 articles were excluded for being non-relevant about sustainability tools, landscape sustainability, landscape indicators or not accessible. No duplicates were noticed. 10 additional articles were also identified from other sources. After excluding non-relevant articles, 71 articles were identified as relevant to our research objectives.

Table 2. Methodology adopted for the search review.

Identification		Screening			Included
From search	**From other sources**	**Duplication removal**	**Search result excluded**	**Reason to exclude**	**Qualitative synthesis**
171	10	181 screened 0 duplicates	50	No tools data	71
			20	No landscape indicator	
			15	No landscape data	
			10	Not accessible	
			9	Not related to sustainability of landscapes	
			5	No landscape policies data	

3. Results

Landscape is starting to be included in the policies themes and in the assessment framework. Still, there is a lack in tools adopting landscape indicators and only 71 were articles were relevant to our research objectives: sustainability, tools of assessment, landscape sustainability assessment and landscape indicators.

To this matter, we will present firstly what is sustainability and then emphasize on measuring sustainability outcomes, and focus on landscape level sustainability assessments.

3.1. Meaning of Sustainability

Two perspectives on sustainability concept are commonly known in the field of sustainable development and environment literature [19]. The first considers sustainability as an aspirational rather than a state [19], in the sense that sustainability is the «direction towards the goal», and not measured in absolute terms [20,21], while the second considers sustainability as «an achievement». In this second case, sustainability is well-defined and can be measured with the use of particular criteria and defined indicators [22,23].

Remarkably, the two mentioned perspectives consider the definition of sustainability as the «three pillar concept» i.e. consider at a time, the three dimensions of sustainability: social, economic and environment [24,25].

3.2. Sustainability assessment approaches and tools

Sustainability assessment is a process [24], that help decision-makers and policy makers to reach sustainability, and decide what should or should not be made to reach a more sustainable society [26,27]. Shortly, Sustainability assessment provides decision makers with integrative environmental – social systems [27]. It considers micro and macroscales to anticipate the short and long term implications of a proposed project, a suggested plan or intended policy [28].

In other terms, it is a dynamic process that considers alternative trajectories to prioritize sustainable actions at a particular time and place [29]. To assess sustainability, there is a wide range of approaches and tools, depending on the context and scale of analysis [30] and they were discussed by Buytaert et al. [31]. Some of the commonly used sustainability assessment approaches and tools are briefed in Table 3.

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Table 3. Common tools of assessment: context and scale of analysis.

	Common tools		Context	Scale of analysis	References
(i)	EIA	Environmental Impact Assessment	Before decisions are taken	Sites or processes	[32]
(ii)	FSA	Farm Sustainability Assessment	Self-assessed	Farm	[33]
(iii)	METT	Management Effectiveness Tracking Tool	Scorecard questionnaire	Protected area	[34]

3.3. Landscape sustainability assessment

To define Landscape sustainability, we should firstly consider the landscape-specific ecosystem service on a long term run. Secondly, the landscape must be able to constantly provide services that are essential to maintain and improve human well-being [35].

But regardless of the absence of common methods for (and indicators of) assessments, and despite the heterogeneity of the approaches, landscape sustainability assessment offered great opportunities to be adopted in new policies or to renew political and planning culture.

The first sustainability assessment used in this regard, was the Environmental Impact Assessment EIA for intervention projects, and reinvented as Strategic Environmental Assessment SEA for territorial programs and landscape programs with an effect on the environment [36]. This latest showed importance in strategic decisions on plans, policies, and programs but unfortunately, it remains mostly voluntary for the landscape approach [36]. Brief descriptions and details about both of these tools, in addition to other environment and landscape sustainability assessment tools, are summarized in Tables 4 and 5.

Most tools known about general sustainability and Landscape sustainability were based on qualitative approaches. We noticed a diversity of uses, going from adaptive, transformative to managerial and development but, none of the tools was holistic.

While sustainability at agriculture level greatly inspired our research into landscape indicators. this is the case of FSA (Known in French as IDEA or Indicateurs de Durabilité des Exploitations Agricoles) that, as other Agri-based policies and quantitative assessments, establishes the multipurposing use of agriculture and attributes the significance of ecological values, in addition to scenic and recreational value of the rural landscape [37].

Nevertheless, our interest in this study emphasis on the use of landscape indicator-based assessments, as is the case of SEA. However, there is a need for quantitative formalization of the landscape, without excluding the qualitative part. According to Fisher [38], landscape plans in Germany were prepared to be used as a state of the environment and help defining development objectives.

It is only since the mid-1990s that landscape plans were used, in parallel to land use plans, to identify and overcome potential impacts [29,37]. Still, achieving landscape sustainability entails persistent corrections, as a result to changing societal priorities [19].

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Table 4. Common tools of assessment of General Sustainability: description and use.

Tools		Brief description	Use	Qualitative/ Quantitative	Reference
EIA	Environmental impact Assessment	Environmental decision making that provides all needed information on the expected impacts of projects prior to execution, thus intended to prevent potential negative impacts and propose alternative solutions	Facilitate informed and transparent decision-making on whether or not a proposal should be given approval to proceed	Qualitative	[32]
FSA v4	Farm Sustainability Assessment (version 4)	Covering three dimensions of sustainability, IDEA is a 41 sustainability indicators based method, used by farmers in a process of sustainability at farm self-assessment, for possible progress towards increased sustainability	Educational, research, farmers, agro-ecological development	Qualitative and Quantitative	[33]
METT	Management Effectiveness Tracking Tool	Scorecard questionnaire on management of protected area to propose rapid adaptation	effectiveness and adaptive management	Qualitative	[34]

Table 5. Some common tools conventionally used in the assessment of particularly **Landscape Sustainability.**

Tools		Brief description	Use	Qualitative /Quantitative	Reference
LCA	Landscape Character Assessment	recognize and classify the uniqueness of a landscape, based on distinctive elements or characteristics, and monitor changes and understand development	region-specific and stakeholder orientated, identifying the basic structures of landscape biophysical components and cultivation patterns	Qualitative	[39]
LPS	Landscape Performance Series	Propose solutions to reach sustainable landscape, through the platform to help landscape designer and landscape agency weigh performance	Transform landscape in design and development process	Quantitative	[40]
LQ	Landscape Quality	Relevant to values and direct use of landscape resources	Analyzing and combining what the public is perceiving, the opinion of stakeholder, and the requirements proposed by an expert	Qualitative	[9]
LVIA	Landscape & Visual Impact Assessment	Help professionals identify impact of new projects on landscape views	involved in design of the landscape and subsequent proposals of management	Qualitative	[41]
SEA	Strategical Environmental Assessment	Evolution of EIA towards sustainable outcomes, and takes landscape in the account	in landscape management, enhance multi-stakeholder dialogues	Qualitative & semi-quantitative	[38]

3.4. Defining landscape indicators and their arising need

The need for landscape indicators (LIs) resulted from the necessity to evaluate and monitor the various landscape aspects and their interconnection nature – human over time, since landscape the

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interaction between the different social aspects of a population, and a geographical area [42]. But the different components of the landscape trace a specific identity, and subject it to considerable pressure. LIs are thus vital tools in identifying the qualities, criticalities of a particular area [10], and single features that express landscape change over space or time [39].

However, covering all landscape facets (so called dimensions of a landscape), needs interdisciplinary approach, that is a rarity in the previous studies, where most published papers focused only on one or two dimension. Also, most landscape assessments using indicators, relied on the ecological indicators, that differ greatly from (LIs).

Even though transferable (not universal), LIs are favored by landscape characters (related to the characteristics of an area) as mentioned by Wascher [39] and are an ideal reference of assessment and monitoring [43]. In that, they provide decision makers and restoration practitioners with a greater understanding of modifying landscape patterns [44].

Considered as indexes – numerical values based – LIs have quantifiable characteristics [45] allowing a large set of data to be minimized to a simple measure [46]. Like all indicators and indices that were developed to measure sustainable development [47], LIs are used in key international sustainability, particularly in landscape sustainability studies [48,49].

3.5. Relevant landscape indicators and categorization

Differently from ecological indicators that use field observations, landscape indicators emphasis on land cover [44], landscape character [45], aspects of landscape perception, and can define social perception [46]. Most importantly, they take into consideration the objective and subjective approach of landscape [50].

Also, indicators and indices developed for sustainable agriculture, were applicable to landscape sustainability studies, but remain copious and difficult to measure [19] especially that landscape is interpreted as a scheme of eco-mosaics with a perceptive and identity realm. Therefore, we should merge to the sustainability indicators mentioned above, with historic [51], visual - social perceptions indicators [52], and land use indicators [53], to be able to explain all landscape facets, and meet the current study objectives.

Literature reveals available landscape indicator sets and summarized in Table 6, and provides a categorization of indicators. According to Valánszki [54], their number is limitless and only few studies explain how they can be used [52], and whether the measurement is quantitative or qualitative, with a stress on the choice of appropriate landscape indicators [45,55].

Table 6. Categorization of relevant Landscape Indicators LIs according to countries .

Country of origin	Methodology	Relevant Landscape indicators	Uses
Europe	Policies establishment	Landscape diversity Landscape quality Landscape character	Landscape-related concepts
Asia	Four indicators sets of performance	Improved landscape livelihoods Improved ecosystem services Improved resource efficiency in land use Supply of food and other products	Landscape at different scales Landscape sustainability management
Catalonia	Ten indicators	Transformation of landscape Landscape diversity Landscape fragmentation Economic value of the landscape Knowledge of the landscape Landscape satisfaction Landscape sociability Landscape and communication Public and private action in the field of conservation Application of instruments of the landscape legislation	Landscape quality

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Netherland	Landscape Perception and assessment	Unity Functional organization Possibility of using landscape for own activities Historical character Natural character Spatial dimensions Sense impressions	Landscape appreciation Landscape perception
Italy	European Landscape Character	Coherence Openness Diversity	Landscape character Landscape policy
United Kingdom	Emerging indicators	Land cover Cultural pattern	Future monitoring at Landscape scale

The Landscape Observatory of Catalonia (CLoT) for example, proposed a set of indicators that measure the physical changing of the landscape, the social perception, and the implementation of landscape policies [56]. Other sets, dealt with only one aspect [39].

In general, indicators that describe well the landscape, particularly the characterization of landscape, are well studied in Europe [52], particularly for the rural landscape. The objectives here were to evaluate the effects of agricultural policies, favoring land use and ecological aspects, discarding landscape related indicators, and ignoring urban and cultural landscapes.

In the following, the categories used in the main European studies, in the common models of landscape quality, and those elaborated by the Landscape Observatory of Catalonia will be presented.

3.6. Landscape indicators in the European studies

The practical use of landscape indicators is becoming familiar in European assessments [55]. The interest relies on two main points: (i) the large diversity of landscape characteristic in a specific region (ii) landscape-related concepts increasingly expressed by policy institutes.

Several countries followed the European countries and developed advanced methods to trace policies and land use mapping, but landscape indicators were still not well adopted. Although, several technics were developed and now commonly used in determining landscape structure (case of Geographic Information System GIS), mostly in countries that implemented Landscape Character Assessments [55].

3.7. The four indicators sets of performance

The Center for International Forestry Research CIFOR prepared a simple set of four groups of indicators of performance [19]. They can be applied across landscapes at different scales.

According to Baral and Holmgren [19], « If all four of these are stable or improving, then we are making progress to meet sustainability targets », and using indicators from each of these groups, can together assess landscape performance to stakeholders, decision makers, land owners and policy makers. Applicable to any landscape system, this framework defined sustainability measures in landscape in order to identify whether a landscape is sustainably managed, or yet any changes are needed to reach landscape sustainability.

3.8. Selection of indicators by Landscape Observatory of Catalonia CLoT

Ten indicators were developed by CLoT creating a basic proposal for landscape quality defined for Catalonia [56], as a reduced list to guarantee their effectiveness (Table 7).

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Table 7. Relevant landscape indicators from Landscape Observatory of Catalonia CLoT.

	Indicator	Brief description
1.	Transformation of landscape	Analysis of changes in the natural and cultural characteristics of landscape which alter its value or its appearance
2.	Landscape diversity	Evolution of the richness of landscape configurations.
3.	Landscape fragmentation	The result of a process of breaking and splitting into pieces the continuity of a landscape and its coherence
4.	Economic value of the landscape	The capacity of a landscape to convert its features into productive resources of diverse economic value
5.	Knowledge of the landscape	The level of recognition and interaction with the landscape which a given population experiences
6.	Landscape satisfaction	The level of satisfaction or dissatisfaction with their landscape of the population living in a given area
7.	Landscape sociability	Makes it possible to ascertain social relations in its widest sense in relation to the landscape and generated by the landscape
8.	Landscape and communication	Approximation to the communicative dimension of the landscape
9.	Public and private action in the field of conservation	Monitoring public policies and private actions in the field of landscape conservation, management and planning
10.	Application of instruments of the landscape legislation	Evaluating instruments such as landscape catalogues or guidelines real contribution to public policies in landscape conservation, management and planning

3.9. Case studies from Netherland, Italian and English landscapes

Landscapes in the mind set of Netherland, Italian and English studies are not reduced to a physical aspect that can be measured, analyzed, monitored, or mapped. It is a human being relation to his environment through beliefs, emotions and senses. This explains the objective or physical qualities of a landscape in correlation with the subjective perceptual and sensory qualities [57].

The qualitative participation in the Netherlands was based on Landscape appreciation and perception [58]. Using the Scales for Landscape Perception and Assessment SLPA methodology, the description by the public was adopted to explain all social, physical and functional factors that influence them [59]. The outcome was the « seven qualities of landscape »: unity, functional organization, possibility of using landscape for own activities, historical character, natural character, spatial dimensions and sense impressions.

From the Italian perspective, landscape is also considered as what is perceived by the population, and results from natural factors and human action in a given area. Italian landscape indicators for sustainable management only became consolidated with the new cultural context of the ELC [60].

What was just mentioned in the Netherland and Italian methodology is unlikely to the regulatory of UK environmental standards, that monitors against a set of indicators designated criteria. However, they were able to develop 158 « emerging indicators » for future monitoring at landscape scale [61].

4. Discussions

This study firstly showed the increasing interest in landscape-related concepts and adoption in policies, and landscape indicators can be developed to help assessing the sustainability of landscapes. They are a non-conventional approach that can be developed at local, national and regional scales.

Large sets of landscape indicators do exist, but a holistic approach for assessing sustainability of landscapes is still missing. It also might be difficult to select indicators aimed at managing and monitoring the landscape, but it is crucial to select a new set of non-conventional indicators, that can

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(i) take into account visual and social indicators (ii) express qualitative and quantitative values and (iii) give a holistic overview on the different landscape dimensions.

The interest in the European landscape assessment approach relied mainly on the similarity in the diversity of landscapes with the country of this current study, Lebanon. Unlikely, there is a gap in the studies about Lebanese landscapes and their sustainability and assessment. They were only mentioned in the National Master Plan of Lebanese Territory NPMLT, that underlines the most important Landscapes of Lebanon and emphasis on the importance of being « a part of a general policy » [62].

No more than this was found. And Lebanon – a full voting member in the United Nations General Assembly since 1945 has established several international agreements and ratifications in this course (Table 8), but mostly related and within the framework of sustainable development and resources conservation of Lebanese Terrestrial Landscapes.

Table 8. International agreements that apply to the Lebanese Terrestrial Landscapes.

	Agreement	Publishing by Lebanese Government	Brief Description	Use	Reference
1.	National Physical Master Plan of the Lebanese Territory	Decree 2009	defines the principles of developments of territory and proposes facilities and sites of planned activities	Territory	[62]
2.	Convention on Biological Diversity	Ratification 1994 Law 360	sustainably use BD and develop national strategies and action plans	Reserve	[63]
3.	UNESCO Convention on Protection of Cultural and Natural Heritage	Adhesion in 1990 Law 19	Identification, protection and preservation	Reserve	[64]
4.	The UNESCO Man and the Biosphere Program		Develop and strengthen models of sustainable development, communicate experiences and lessons learned	Biosphere reserve	[65]
5.	Convention on Climate change 2015, updated in 2020	Adhesion	Reducing greenhouse gas concentrations to avoid manmade interference with the climate system	Territory	[66]
6.	Convention on Combat Desertification	Ratification 1996	strategic and technical recommendations for mitigating the impact of desertification	Territory	[67]
7.	Land Degradation Neutrality	Initiative	the implementation of sustainable land management practices and institutional and legislative measures	Territory	[68]
8.	Sustainable development goals	National commitments	Accomplishing the SDGs with Integrated Landscape Management	Territory	[69]
9.	Forest and landscape restoration	Initiative	encouraging an integrated landscape management restoring resources and services provided by the landscape	Forest	[70]

Most agreements are used at either territory or reserve level. In the first case, agreements are meant for preservation or protection purposes while in the second case, for management purposes. An exceptional national commitment for Sustainable development goals SDGs must be highlighted, since Integrated Landscape Management is applied.

Nevertheless, the Lebanese 130/2019 law reinforces the establishment of new protected landscapes (Table 9). Considered as an essential pillar of development policy and ecotourism, the law 130/2019 consists of 23 articles aiming the prevention and protection of the natural areas in Lebanon. Five main categories are observed while no clear consideration to landscape integration, rehabilitation or enhancement.

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Table 9. The protected areas in the Lebanese Law.

	Category	Description	Party involved	Legal instrument
1.	Nature Reserves (Mihmiyat)	A terrestrial or marine zone created to conserve an ecosystem or endemic species	Supervised by Ministry of Environment MoE	Law
2.	Natural Sites and Monuments	An area encompassing sites of natural or cultural importance	Protected by MoE	Decree
3.	Protected Forests	Protected sites	by decision of Ministry of Agriculture MoA	Law 85 / 1991
4.	Protected sites (Hima)	Managed and assorted by Community	by decision of Ministry of Agriculture MoA	Municipal Decision
5.	Natural Parks	A partially inhabited rural territory, with exceptional natural and cultural heritage, with the combined «strict conservation» and «sustainable use» system applied	Under the supervision of Ministry of Environment MoE	Law 130/2019

Community contribution is highlighted in the above table, mainly in the Hima category, where protection and management of site is initiated from the community. The different existing laws haven't yet mention landscape preservation. However, with citizens' participation, the Lebanese state can enhance, classify and protect landscapes.

Last but not least, we must underline the drastic need for a reference to the value of Lebanese landscapes, both in urban and rural areas, defining all landscape strategic framework. Preserving the landscape suggested hereby, goes for preservation of the visual identity and the genuineness of the natural and built landscapes of Lebanon.

5. Conclusion

Many issues have been raised, including the increasing interest in landscape-related concepts and the need to adopt them in territorial and management policies. Also, in the presence of different tools, a complexity of reference is shown with a chaotic fields of application. Yet, most approaches are qualitative and environmental indicators based.

Therefore, to objectively and quantitatively assess landscape sustainability, arise a need for a new tool, based on new adaptive set of indicators.

Landscape indicators showed the best reference to landscape sustainability, and on different scales. Some of the large sets of indicators can be adopted to the Lebanese landscape indicators, but an adaptive method should be applied. That's why, what is offered so far as landscape indicators, can be a good example for Lebanese Landscape Indicators (LLIs), to provide clear signs of the success or failure of proposed project or policies and guiding decision-makers to prioritize the landscape. They must communicate clearly and precisely about the features of landscape to the citizens of Lebanon, in order to facilitate and improve their understanding.

Accordingly, a mixed and holistic methodology will be applied and different data types will be needed to fully contribute to the identification of landscapes, furthering the knowledge of existing challenges and relate further to conservation, management and planning.

One must know that Lebanese Landscapes show variability in characteristics, in physical aspects and in functional requirements, they present a unique visual identity and a genuine natural and built landscapes. They are an exceptional scenic reprieve in an integrative community, worthy not only management and design, but also worthy conservation.

Last but not least, the development of a non-conventional and holistic assessment of landscape sustainability is widely needed. Landscape indicators are the main component for the success and further studies will follow to ensure the development of this tool, and further enhancement.

Data availability: Data will be made available on request.

Declaration of Competing Interest: The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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