

Green methods that are used to ensure the sustainable development of the environment and the society

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Abstract. Nowadays, pollution is one of the biggest challenges for human society. Many types of research are directed toward finding sustainable solutions with minimum or no environmental impact. The contaminants affect the ecosystem components and the people's health equally. Cardiovascular and cancer are only two examples of diseases for which air and food adulteration are directly influenced. For each situation, the conditions need to be evaluated. Environmental accidents or rehearsal ones can determine the risk sources. Regardless of the case, prevention measures are always recommended. Different organic wastes recovery represents a possible solution ensuring an endurable process. Such an approach has to be also looked at from an economic point of view. Renewable natural raw materials usually have lower costs. Independent of the considered strategies, they all have to be based on two pilings. One acts by the authority's involvement using legislation and standards, and the other refers to society through awareness and implication. The paper highlights some of the most recent and significant findings regarding eco-friendly and sustainable techniques newly developed that were presented in recently published articles. The topics considered essential for this approach regarded the improvements made to increase the city life, the industrial environment, and the laboratory techniques.

Introduction

The industrial revolution can be considered the starting point for the decrease of natural ecosystems stability. Independent of the sector, all activities come along with different environmental challenges. The progress has to be also evaluated from the ecosphere impact point of view. This purpose supposes the involvement of all national and international authorities to elaborate, implement, control, review, and improve specific methodologies. Such an approach will contribute to durable development. Another important aspect refers to impoverishment decrease through natural resource exploitation and energy improved valorization.

All deciders must correctly evaluate the changes that occurred till now and adopt feasible procedures to limit environmental degradation [1]. The last one and a half year's situation underlined the need and importance of natural oases in or near the urban agglomerations. Different tree species integrated into the green civic spots have double

roles, ensuring durable environmental development and contributing to the individual's health improvement [2] through the pedestrian moving spaces [3] and natural oxygenated areas. Also, lately, we could observe an increase in information technology use and importance in our daily activity. Based on this approach, green spaces analysis can be made by applying new innovative instruments. The data can be provided through different media platforms and be investigated from a distance [4], [5].

The theme chosen presents a new perspective regarding the factors that influence the sustainable development of a society. Few reviews link the treated aspects as a whole. The citizen's wellbeing is the result of all factors affecting daily life. The three elements discussed in the present review can create the optimum environment that contributes to society and ecosystem durability.

City life improvement

Durable civic agglomerations are created following methodical plans. The principal aspects that should be considered in their elaboration refer to ensuring the population's basic needs: access to quality water resources, ecological technologies, infrastructure, parkland, and waste management. A critical aspect of pollution reduction is related to the decrease in urban transportation, regardless of whether we consider the individual or the public. City organization in multiple centers that ensure all basic demands, such as workplaces, educational, health and security institutions, and playgrounds, could be one feasible solution. Short distances between the objectives encourage individual mobility, improve physical condition, and decrease gas emissions [6]. Designing such sites ensures enough green parklands, which is unfavorable in these situations due to the limited space extend [7]. There is no ideal architectural model of small or large urban agglomerations. Each one has its advantages and disadvantages.

Studies made at the European level underlined the importance of green spaces present in the different cities. The vegetation index was correlated with the citizen's environmental perception. An exciting finding associates the importance of the ecosystem in daily life more with the inhabitants with lower incomes [8]. Generally, the respondents of the surveys are encouraging the authorities to implement green strategies for sustainable local development and increase the awareness of the importance of this trend. The civic design and local ecosystems management must be made based on durable development principles [2]. In Belgians perception, the perfect green oasis has to ensure relaxation and sanitation conditions, largeness, preservation, establishments, and a common point with other citizens, to create a security feeling. Lower significance is attributed to the simplicity or the national heritage [10].

The agri roofs represent a practical solution to increase the cities green index. Performing such indicative may encounter different obstructions as Zambrano-Prado et al. summarised it in their paper. These can vary from legislation deficiency to clime characteristics or cost. On the other hand, positive aspects such as life quality enhancement, good opportunities for landscape painters to expand, or aesthetic enhancement need to be mentioned [11].

Another interesting new approach regards the algae integration in cities' daily life. Cooperation between the decedents, economic sector, and researchers will contribute to obtain durable eco centers. This planning model might improve the carbon print index based on these organisms' capacities to convert CO₂, sunlight, and nutrients, into O₂ and biomass [12]. Another ecological technique that might contribute to sustainable green development consists of projecting plant recovery systems for groundwater. Field evaluation of such strategy connected the increase or loss of green urban surfaces with the general ecosystem improvement or degradation [13].

The general population decline left behind a problem present in several communities, the discarded locations. Besides the general unesthetic look, the situation could affect the person's health. On the one hand, allowing different invasive species as *Ambrosia artemisiifolia* to develop and determine serious sanitation inconvenience, and on the other hand, they create hostile perceptions at the emotional level. An alternative for such situations is their greening transformation and inclusion into the local circuit as promenade places. This approach will increase individual comfort, encourage human interactions, physical exercises, or enhance social security [14].

The majority of local decision-makers promote strategies for sustainable regional development, which includes improving the green index. To take full advantage of such an approach, citizen proposes should also be considered along with the specialist one. Not long ago, Campagnaro et al., from their research, summarised some intriguing findings in respect of landscape arrangements, as the use of multicolored floral arrangements, or few and far between trees, respecting the local natural design as possible. The presence of the old architectural monuments does not necessarily create a state of safety. The options expressed are underlying the person's need for physical and mental security [15].

Unfortunately, not all countries have implemented successful strategies for urban green regenerations, Romania being one of these. Gavrilidis et al. showed the limited interest of the authorities to implement durable programs for developing eco-friendly infrastructures [16].

Industry approaches

Classical technologies could be considered less or not at all eco-friendly. The current worldwide trends demand methodology adjustment. Such an approach supposes a joined force for experts from different fields to elaborate on new procedures or modify the classical one. The main targets regard improving the efficiency-costs ratio, simplicity, and environmental feasibility [17]. Sustainable industrial production uses new tools as a result of research and innovation. Performance increases and simultaneously waste reduction, human and ecosystem wellbeing can be achieved by applying solutions that were elaborated taking into account principles of green chemistry, precisely limitation of the decline of the natural resource [18].

One of the current tendencies is to concentrate the industrial player in specific locations. Such arrangements modify the local natural environmental infrastructure through in-depth supply use and by-products discharge increase. Most of the researcher focused on evaluating the peoples' actions on different ecosystems. Fewer analyses were made on the industrial park's footprint. Adaptation of classical evaluation methods can offer helpful information for the manufacturing sector in resource use optimization [19]. The ecological compensation concept proved its importance in optimizing the essential players' reasonable and progressive attitude towards the environment. It is a proactive feature that contributes to improving cost-effective legislative politics [20].

Industry negatively impacts the local ecosystems through different mechanisms. Special attention must be given to the various wastes released in nature, which are chemically active and react with the nearby natural factors. Here must be mentioned the situation that leads to different vegetation areas decrease around major polluters, regardless of the contaminant aggregation phase. Fortunately, nature can give us the necessary levers to warn ourselves about the beginning of unstable natural equilibrium and some native restorer ways. In such a context, different bio and phytoremediation studies are made, along with the attempt to determine specific sentinels. In cases of heavy metal contamination, species as *Gymnocarpos decander* or *Atractylis serratuloides* have been proven marker properties [21]. If we refer to soil contamination, an aspect that needs to be considered is its

pedologic characteristics and the specific interactions with the herbal species that present toxic metal accumulation capacities. *Amaranthus Hypochondriacus L.* grown in cadmium soil polluted was less negatively influenced by normal magnesium and calcium quantities. Also, the photochemical and the decontamination parameters exhibit increased values [22]. *Brassica napus* and *Sedum alfredii* inter cultivation might be a feasible opportunity for Cd polluted lands from both ecologic and economic perspectives [23]. All the alternatives presented have different limitations, one of them being the initial contamination degree. Good phytoremediation results have been obtained in studies on Cd, Cu, Pb, Ni, Cr, Fe, Zn, or As contaminated ecosystems. *Phragmites karka* presented better qualities in respect of interest capacities than the one exhibited by *Arundo donax* [24].

Mirzaee et al. brot into attention another possible phyto utilization, discussing the situation of the waters used in agriculture. In some cases, their high salinity and TDS levels cause orifice warping of the irrigation system. The problem directly affects crop growth and adds supplementary costs for remediation. The use of *Cortaderiaselloana* showed promising results in wastewater treatment compared with *Chrysopogonizanioides* species [25].

In the massive solid particle quantity increase, *Stipa tenassissima* or *Plantago coronopus* proved to be highly vulnerable [21]. *Lygeum spartum* and *Atractylis serratuloides* are examples of biological varieties that might be considered for durable eco approaches [26].

Analytical techniques

Standard chemical determinations protocols usually use harmful reagents. There are two possibilities to limit their toxic environmental potential. One considers neutralization before discharge. The other proposes a new analytical method using lower reactive quantities or replacing them with less toxic ones. The second option could provide favorable conditions also for the technicians. Microextraction techniques have proved their feasibility in the case of steroid hormones residue detection. The method presents different alternatives (solid or liquid phase, stir-bar sorptive, or using packed sorbent), which can be successfully used on biological or environmental samples [27].

Another approach that is newly developing is based on supramolecular chemistry. Based on its principles, non-chromophoric methacholine compounds could be spectrophotometrically quantified. The method accuracy and green feature were evaluated based on indexed methods and scales [28]. If we refer to eco-friendly analytical techniques, we have to consider different aspects such as simplicity in use, mobility, the possibility for automatization, the minimum intervention of the technician, or reduced quantity of toxic reagents used and limited wastes. The surface-enhanced infrared absorption spectroscopy technique proposed by Sherif M. Eid et al. satisfies the mentioned requirements. SEIRA is a viable alternative to the classical methods used for active compounds dosage [29].

Isoflavones are an important class of active compounds possible to find in the wastewaters due to manufacturing, municipal, and/or cultivation activities. These are also natural constituents of different microorganisms. At present, they are considered as emerged formulations newly discovered in raw effluents. In these conditions, there are limited resources to neutralized them into the wastewater treatment plant and accumulate in natural aquatic environments, possibly determining adverse effects on the balance of ecosystems and the species that populate them. Carbon fibers proved to be a durable eco-friendly method grepping material [30].

Projection of new sustainable analytic methods has to consider different aspects such as the solvent's nature, sample preparative steps, and the analytical techniques. The deep

eutectic solvents have specific characteristics that recommend green reagents, safe to use due to limited or no residual products [31].

Independent of the approach considered, all new techniques must be projected in simple manners, with optimized time and costs [32]. Another characteristic that shouldn't be neglected is its reproducibility.

Conclusions

United Nations Organisation Agenda for Sustainable Development comprises multiple objectives. Some of the ones projected till 2030 refer to poverty and hunger decrease if not eliminated, health, and wellbeing improvement, sustainable societies. These can be achieved only through ecological mechanisms. Green vision has to be reflected in local, national, and international approaches. Strategies concerning eco-friendly technologies and natural resources protection contribute to perform sustainable future progresses.

Also, according to the European Commission, the ecosystem provocations and modifications have to be view from a durable public perspective. First of all, educative elevation will have repercussions in whole sectors. An informed person can better analyze the context and decide the optimum mechanisms that ensure a healthier life for him and an environmentally sustainable perspective. Such goals are achieved by applying conscientious resource management and integrating circular economy principles in daily life activities. The advanced use of renewable resources allows the streamline increase into the industrial sector. City and manufacturing sector digitalization contributes to resource consumption reduction, with an actual decrease in biodiversity negative impact.

The different new approaches presented in the paper underline their feasibility and the easiness to use and implement. The agri roofs, for example, improve the environmental design, contributing to air quality enrichment and citizen's mental comfort.

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