

Environment and sustainable development: how to tackle with urban freight logistics consequences

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Abstract

Worldwide, more attention has been paid to this issue through the concept of sustainable development. The need for natural heritage protection is regulated not only at national level but internationally as well. Natural resource constraint is a crucial factor that humanity must rationally and plan to manage when it comes to uncontrolled exploitation. Today, as the world reaches the zenith of technological development, with half the population concentrated in cities, it is clear that the concept of sustainable development could not be realized unless the problem of urban growth is overcome. Complete sustainable development is achieved through a balance between multiple pillars. One of them is very important because of its complexity and multidimensionality, such as the logistics sector in urban areas.

For this reason, in this paper, in order to answer specific questions and minimize environmental issues, to shape them into "green institutional moderation", we will focus how to tackle with urban congestion and green logistics issues and to make "amortize the consequences of the negative externalities" of cities.

Key words: sustainable development, environmental, greenhouse gas emission, green logistics sector

1. Introduction

Humans are an integral part of the global ecosystem and only they can and must influence its survival. The danger of biodiversity degradation is at the same time a danger to the underlying system that sustains life on planet Earth. The world today is facing unstoppable changes.

The most widely accepted population projections are those of the UN [1]. According to its latest forecasts from 2010, the global population will increase by about 1 billion by 2030, to reach 8.5 billion. It is not widely appreciated, however, that the UN considers three possible scenarios, each implying a rather different population evolution over a longer time period. While most attention is usually focused on the "medium" scenario, which sees the global population growing until 2050, under the "low" scenario, the global population would peak just

before 2030 and start declining thereafter. By contrast, under the “high” scenario, the global population would explode in the long run.

Such explosive growth significantly affects the diversity, quality and character of planet Earth. Demographic pressure, coupled with uncontrolled depletion of natural resources and inadequate environmental care, can lead to loss of biodiversity, which will be reflected in the sensitivity of ecological potentials in the form of depletion and extinction of species. There is a certain threshold of diversity under which ecosystems are unable to function. This means that all self-organized living systems require a certain minimum of species diversity in order to be able to accumulate solar energy and develop a cyclic relationship between producers, consumers and reducers.

Following surveys and forecasts of the world's demographic, economic and social conditions, the United Nations points to the alarming forecasts that the world will face in the coming decades. In that regard, lessons of the past several decades have spurred an evolution in concerns about continued population growth, which today tend to focus less specifically on the volume of food production and more broadly on the numerous pressures exerted by growing populations on the natural environment – land, forests, biodiversity, ground water, oceans, air quality and climate – through unsustainable production and consumption patterns. Generally speaking, the human impact on the environment is determined by three intersecting factors: 1) population growth and 2) economic growth, which together shape production and consumption demands; and 3) technological advancements, which influence the efficiency and impact of the consumption of resources .[2]

What we need to know population projection for the future decades in the world or regions? According the study estimates that as of 1997 [3] the ecological footprint of the Earth's total population was at least 30% higher than the Earth's biological reproductive capacity. This deficit is made up by consuming or drawing down natural capital, thus “borrowing from” or perhaps “robbing” the future. Scholars may have statistical arguments over the best measures of carrying capacity demanded and supplied, but the basic qualitative conclusion of unsustainable trends is hard to deny.

2.Globalization and growing market demand

Globalization as a worldwide process would not be possible without well-developed and technologically equipped transport networks. Market demands increased their bids, which also pushed the inevitable demand for transport services, which enabled an increase in economic movements in the logistics system. That is, each need stimulates the growth of the other. In today's globalized world, consumers can buy products that were not offered just a few decades ago and are now delivered to their doors as an integral part of modern logistics practices. Our lifestyle and consumption aspirations have changed accordingly, which in turn changes our market management techniques to meet global consumer expectations.

Increased trade in services could potentially boost the growth and development prospects of developing economies. Services exports of developing economies have risen rapidly over the past decade, as reflected by the increase in developing economies' share of global services exports from 23 per cent in 2005 to 29 per cent in 2016. By category, the main shares of global services exports of developing economies comprise construction, travel and transport services, in contrast with the trade profile of developed economies, which are more focused on higher value-added services.[4]

The mobility need can be assessed in different ways. First, is the journey essential or just a pleasant treat? Can it be avoided? Second, can the journey be shifted to a more environment friendly transport mode, such as opting for train travel instead of flying, or for public transport instead of driving? And last, can the transport mode be improved? [5]

Companies that promote the concept of green logistics and are "eco-labeled" are striving to utilize minimal amounts of energy in their production technologies to make

them environmentally sustainable and easily renewable. These companies collaborate with other companies, and according to the outsourcing model they save significantly on transportation costs and behave environmentally responsible towards the natural environment and society. In their technology, they prefer to reuse containers, pallets and boxes instead of reusable packaging. Eco-friendly companies are maximally committed to all phases of their technological work, from the packaging design point of view, the choice of raw materials for product packaging, to the reduction of pollution resulting from the use of products, up to delivering eco-friendly products to end-users.

3.Sustainable development indicators

According to the Chapter 40 of Agenda 21[6] , the action plan adopted in 1992 at the United Nations Conference on Environment and Development in Rio de Janeiro, calls on countries, as well as international, governmental and non-governmental organizations, to develop indicators of sustainable development that can provide a solid basis for decision-making at all levels. Agenda 21 also calls for the harmonization of efforts to develop such indicators.[7]

Sustainable development indicators [8], abbreviated as **SDI**, aim to measure sustainable development over longer periods of time. **SDI** contain a core set of 50 indicators. These core indicators are part of a larger set of 96 indicators of sustainable development. The introduction of a core set helps to keep the indicator set manageable, whereas the larger set allows the inclusion of additional indicators that enable countries to do a more comprehensive and differentiated assessment of sustainable development. Core indicators fulfill three criteria. First, they cover issues that are relevant for sustainable development in most countries. Second, they provide critical information not available from other core indicators. Third, they can be calculated by most countries with data that is either readily available or could be made available within reasonable time and costs. [9]

The sustainable development indicators are grouped into 10 subject categories:

- socioeconomic development;
- sustainable consumption and production;
- social inclusion;
- demographic changes;
- public health;
- climate change and energy;
- sustainable transport;
- natural resources;
- global partnership;
- good governance.

Many of these areas are recurring themes that appear across *Urban Europe — statistics on cities, towns and suburbs*.

Future human endeavors must be directed to a new model of economy, based on the worldview and principles of “ecological economics”. Shortly, these include the ideas that:[10]

- Our material economy is embedded in society, which is embedded in our ecological life-support system, and we cannot understand or manage our economy without understanding the whole interconnected system.
- Growth and development are not always linked, and true development must be defined in terms of the improvement of sustainable human wellbeing, not merely improvement in material consumption.
- A balance of four basic types of assets is necessary for sustainable human well-being: built, human, social, and natural capital (financial capital is merely a marker for real capital and must be managed as such).

- Growth in material consumption is ultimately unsustainable because of fundamental planetary boundaries, and such growth is or eventually becomes counterproductive (uneconomic) in that it has negative effects on well-being and on social and natural capital.

These assets, which overlap and interact in complex ways to produce all human benefits, are defined as: **[11]**

- Natural capital – the natural environment and biodiversity, which, in combination with the other three types of capital, provide ecosystem goods and services: the benefits humans derive from ecosystem.
- Social and cultural capital – the web of interpersonal connections, social networks, cultural heritage, traditional knowledge, institutional arrangements etc.
- Human capital – physical and mental health, knowledge, and other capacities that enable people to be productive members of society.
- Built capital – building, machinery, transportation infrastructure, and all other human artifacts and services that fulfil basic human needs.

Natural resource constraint is a crucial factor that humanity must rationally and plan to manage when it comes to uncontrolled exploitation. So are the commitments of world governments and institutions for sustainable development. Worldwide, more attention has been paid to this issue through the concept of sustainable development. The need for natural heritage protection is regulated not only at national level but internationally as well. The international community within the UN through its executive agencies has built and defined a complex international program for the protection and restoration of natural resources.

The international community (UN, European Union) is well positioned to take the lead in leading sustainable development globally. It is the world's largest donor of development funds. International institutions are based on leading mutually supportive strategies for sustainable economic growth, social development and environmental protection. Investing in a shared future with its closest neighbors is fundamental to the long-term political stability of the international community itself. International institutions and bodies therefore fund development programs aimed at achieving political stability, safe economic conditions, social cohesion and environmental sustainability. The strategic approach of every country in the world must inevitably follow the principles of sustainability of development as a kind of prism through which the developmental perspectives of civilization development are assessed.

It is also worth noting that the 1999 Structural Fund Regulations reinforce the requirements for the inclusion of environmental sustainability in the programs for the period 2000-2006, making them more extensive and more systematic. In Council Regulation no. 1260 of 1990 (Council Regulation 1260/1999) concerning structural funds, it is stated that . . . In its efforts to strengthen economic and social cohesion, the community also supports the balanced, balanced and sustainable development of economic activities. . . and a high level of environmental protection and improvement. Efforts in particular to integrate environmental requirements into the design and implementation of the work of structural funds. ... This integration of environmental issues as a horizontal theme in the creation of the 2000-2006 program is articulated with a comprehensive framework and many programs from this period include projects that are directly related to environmental sustainability.

4. Does the sustainable development concept is only in the sphere the environment?

The concept of sustainable development encompasses not only the environment, the need for preservation and the consequences of the 'negative externalities' of cities but also the social and economic components of development, which must still be respected if the environment is to be sustainable. Thus, the essence of this program is the interaction of environmental

development and the interdependence and complementarity of development and environmental policies that respect the legalities of environmental systems.

Today, as the world reaches the zenith of technological development, with half the population concentrated in cities, it is clear that the concept of sustainable development could not be realized unless the problem of urban growth is overcome.

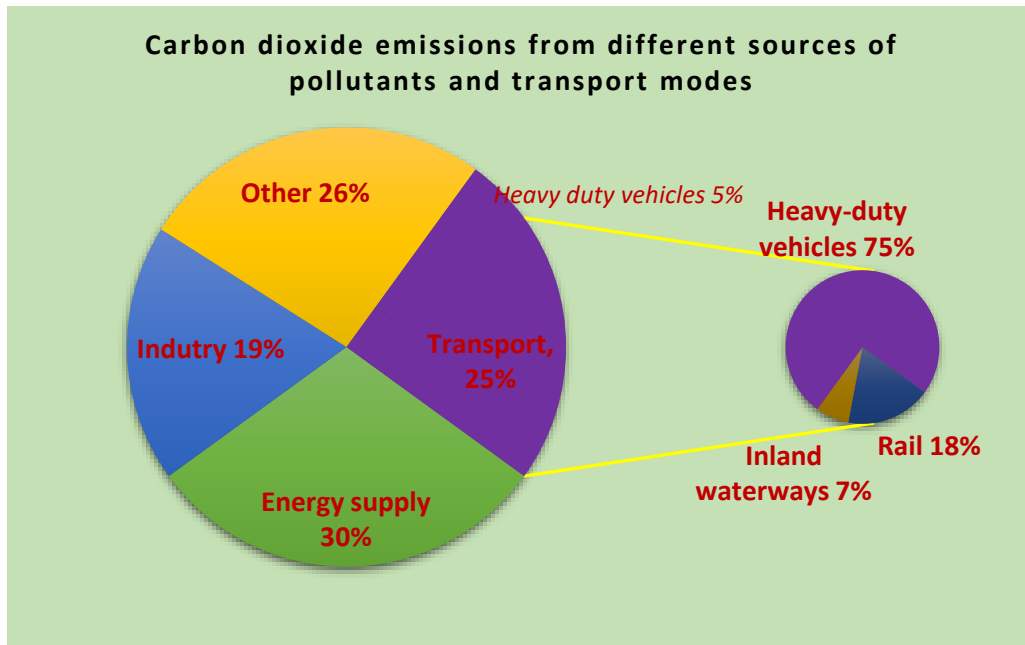


Figure 3 Carbon dioxide emissions from different sources of pollutants and transport modes
Source: ACEA: Reducing CO₂ emissions from heavy-duty vehicles. London: European automobile Manufacturer association, 2017.p.2.

<https://reducingco2together.eu/assets/pdf/trucks.pdf>

However, the concept of sustainable development puts environmental quality and all policies at the local, regional and global level in the domain of industry, transport, agriculture, tourism and other activities that affect the quality of the environment.

Full implementation of the Sustainable Development Concept requires legislation in the field of environmental protection covering:

- Protection of water, land and air;
- Disposal of wastes and toxic chemicals;
- Radiation protection; and
- Protection of natural resources

The essence of the concept of sustainable development derives from the Triple bottom line concept, which implies the balance between three pillars of sustainability – environmental sustainability focused on maintaining the quality of the environment which is necessary for conducting the economic activities and quality of life of people, social sustainability which strives to ensure human rights and equality, preservation of cultural identity, respect for cultural diversity, race and religion, and economic sustainability necessary to maintain the natural, social and human capital required for income and living standards. Complete sustainable development is achieved through a balance between all these pillars, however, the required condition is not easy to achieve, because in the process of achieving its goals each pillar of sustainability must respect the interests of other pillars not to bring them into imbalance.[12]

Particularly important are all activities in defining, locating and eliminating environmental impacts. Defining Environmental Impact "Environmental impact" may be considered to have three components:[13]

- Environmental stressors such as pollutants, noise, or exotic species are released in natural ecosystems. Each ton of goods transported places additional stress on the environment; many stressors may therefore be measured in units per ton of goods transported;
- The total amount of stress placed on the environment depends on the quantity of goods and the distance they are transported; in the simplest form, total stress is the quantity of goods times the distance carried multiplied by the stress per ton. The second component of stress involves the spatial pattern of goods transported, including the transport mode used;
- The environmental impact of the total stress is determined by the nature of the receiving environment. Ambient characteristics such as physical ecosystem characteristics, density of the human population affected, and whether the receiving ecosystem is considered critical or includes endangered species will determine both the physical impact of the stress and willingness to pay to prevent it.

Making an analysis of how or why people use and value space and the reasons for these interpretations, it is possible to propose a different or more appropriate definition or use of green infrastructure in landscape planning. As a result, the role of the interpretation of the environment may be to support or challenge the appropriateness of the principles for green infrastructure and their utility in landscape development. The three main themes of this thesis - green infrastructure, environmental perception, and spatial planning - will examine the relationship between how people view and interact with the landscape and how these attitudes can be integrated into different strategic strategies for green infrastructure planning and implementation plans.

The current research and the rich debates on this issue indicates that no single widely recognized definition of green infrastructure is identified in literature. However, the latest European Commission description of green infrastructure, adopts an all-embracing version of the concept. According to the Directorate-General for the Environment,[14] Green infrastructure is a concept addressing the connectivity of ecosystems, their protection and the provision of ecosystem services, while also addressing mitigation and adaptation to climate change. It contributes to minimizing natural disaster risks, by using ecosystem-based approaches for coastal protection through marshes/flood plain restoration rather than constructing dikes. Green infrastructure helps ensure the sustainable provision of ecosystem goods and services while increasing the resilience of ecosystems. The concept is central to the overall objective of ecosystem restoration, which is now part of the 2020 biodiversity target. It also promotes integrated spatial planning by identifying multifunctional zones and by incorporating habitat restoration measures and other connectivity elements into various land-use plans and policies, such as linking peri-urban and urban areas or in marine spatial planning policy. Its ultimate aim is contributing to the development of a greener and more sustainable economy by investing in ecosystem-based approaches delivering multiple benefits in addition to technical solutions, and mitigating adverse effects of transport and energy infrastructure.

Landscape form and multifunctionality of space are vital elements of the green infrastructure agenda. Contemporary scientific approaches have a huge mosaic of concepts about the phenomena, features and benefits of green marketing. According to Ian Mell Green [15] infrastructure as a term relates to the connective matrices of greenspaces that can be found in and around urban and urban-fringe landscapes. They provide a number of complimentary benefits for ecological, economic and social spheres and have been increasingly.

5. Urban freight logistics and how to tackle with contamination and harmful consequences

The logistics and freight transport industries are ones of the most dynamic and important sectors of each economy. Logistics is far more than just goods transport, warehousing and

special process solutions. On average, logistics costs account for 10-15% of the final cost of the finished product. This includes costs such as transportation and warehousing. Logistics provides a vital “backbone” function in supporting macro-economic processes and the operation of markets, critical infrastructures and distribution to both business and consumers. Since logistic companies typically use a wide range of transport modes – trains, trucks, planes and ships - they are interested in improvements that affect the entire system. [16]

According to Heiko von der Gracht, director of the center for futures studies and knowledge management the logistics, explosion in the emerging markets will be immense, will elevate the international flows of goods to an unknown level, herald the globalization programme and unite the world under one roof, as seldom before in history. He point out that gigantic quantities of goods will flow between Africa, Asia and South America with the support of North American and Western European means of transportation and logistics services. The world will grow together in a common team effort in a way which sociologists and utopians have only dreamed about. And logistics will be right in the middle of it all – but only if you begin to prepare for this wonderful team effort today.[17]

In order to overcome the unfavorable conditions in the city cores, it is necessary for the urban authorities to provide measures to tackle with contamination and harmful consequences, produced of freight transport vehicles.

To achieve the goal of green logistics, the overall organization of the transport sector needs to be considered in the broader context of sustainable economic, environmental and social development. Rapid urban development and rising living standards have led to an increase in the number of cars in city centers and increased environmental pollution. What is different about transport is its critical impact on numerous operations on logistics performance. Today, operational expectations are becoming more precise, the business phases and performance cycles are more compact, and the margins of error are reduced to zero, so it is because of this strategy that successful firms have realized that there is no such thing as cheap transport, or will cost the company itself too much. In such competitive circumstances, it is necessary for transport to be managed in an effective and efficient manner, together with procurement, production and market distribution efficiency, as the market expectations of companies in managing distribution channels will not be met.

Green logistics is necessary to understand the interactions of logistics with the socio-economic system as a whole, enabling sectoral policies to be reconciled with the overarching policy goals of the region. In such an environment, growing industry, such as the logistics sector, plays a key role in the region's long-term sustainable development.

Due to its high level of complexity, urban freight logistics has economic, environmental and social impacts as cities are confronted with more traffic, congestion, noise and pollution. Root causes for these problems range from inadequate road infrastructure and inefficient logistics processes resulting from a low load factor to unnecessarily long dwell times and/or high numbers of individual deliveries.

In 2016 [18], road transport was responsible for almost 72 % of total greenhouse gas emissions from transport (including international aviation and international shipping). Of these emissions, 44 % were contributed by passenger cars, while 19 % came from heavy-duty vehicles. In the same analyzed year (2016), transport (including aviation and shipping) contributed 27 % of total greenhouse gas emissions in the EU-28. This figure drops to 20 % if international shipping is excluded from the overall value. EEA estimates show that emissions from transport (including aviation) further increased by 1.5 % in 2017.

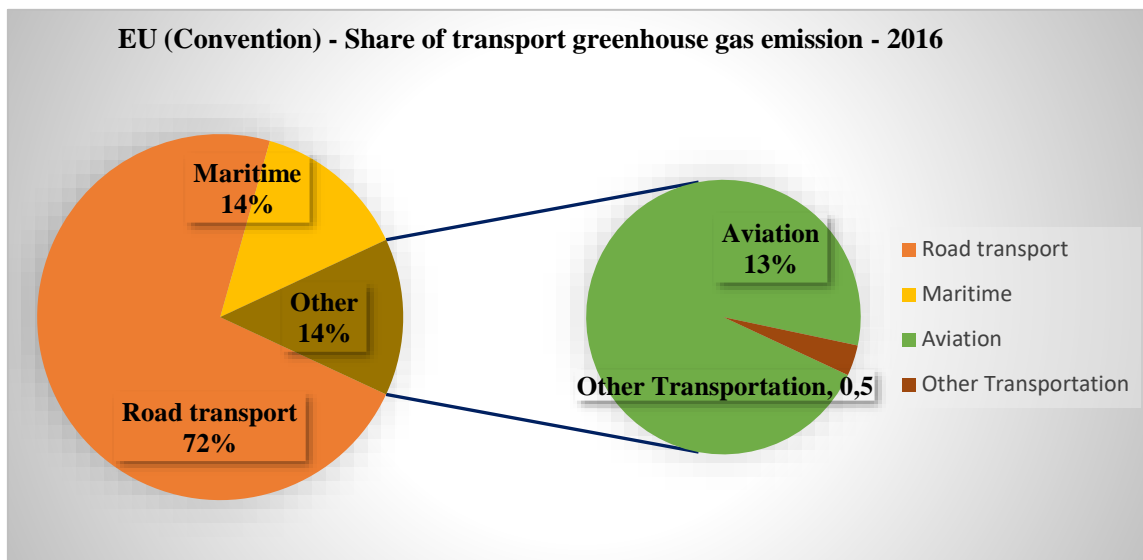


Figure 1. EU (Convention) — Share of transport greenhouse gas emission

Source: National emissions reported to the UNFCCC and to the EU Greenhouse Gas Monitoring Mechanism provided by European Environment Agency (EEA)

<https://www.eea.europa.eu/data-and-maps/data/national-emissions-reported-to-the-unfccc-and-to-the-eu-greenhouse-gas-monitoring-mechanism-14>

According to McKinnon and Kreie [19] regardless of the longterm effectiveness of carbon reduction measures being adopted today, it will be necessary, for at least several decades, to adapt our logistical systems and supply chains to the stresses of a climate-changed world. We have coined the expression 'adaptive logistics' as a collective term for the modifications that will be required to logistics systems to adjust to the effects of climate change. This new area of research could become an integral part of a wider, multi-disciplinary field of 'adaptive sciences'.

City governments and transport policy makers in urban areas need to adopt a holistic approach to land use planning that will take into account the needs of urban heavy haulage transport that is created by emerging market needs as well as logistical needs. Such an approach can be highly effective in the long run because it can have a sustained beneficial impact on the viability of operations on urban heavy haulage operations.

To overcome the current problems of air pollution and noise from heavy goods vehicles, city authorities must take an accurate system of actions to prevent contamination and harmful consequences. Such activities would include the following measures:[20]

Time windows - for freight deliveries are most likely to be established in the centres of Smaller Heritage Urban Areas and pedestrianised zones in Metropolises and Other Large Urban Zones in order to avoid conflicts between sensitive urban environments and pedestrians on the one hand and freight vehicles on the other. However, where the time windows coincide with peak commuting hours, they can lead to traffic congestion and are likely to lead to the poor utilization of vehicles.

Vehicle weight and size restrictions - are essential to avoid the circulation of freight vehicles over a certain size or weight where they will cause damage to road infrastructure, damage the fabric of (perhaps historic) buildings or where freight vehicles will struggle to maneuver effectively and therefore cause road congestion. However, in the context of seeking to promote sustainable urban distribution, blanket weight and vehicle size restrictions over wide areas, rather than for specific streets or small areas of a city, are often counter-productive.

Low Emissions Zones (LEZs) are where access to urban areas is limited to freight (and sometimes passenger) vehicles that meet certain emissions standards. They are usually introduced in Metropolises or Other Large Urban Areas where air quality is a particular

concern. LEZs are becoming increasingly common in major European cities as a means for city authorities to seek to meet European air quality standards. Poor air quality is a major and urgent issue for some Metropolises and Other Large Urban Zones in Europe because of its impact on human health. In this context regulatory measures that reduce emissions of particulates are urgently required in the absence of, for example, a radical move away from diesel engines to the use of low and zero emission vehicles.

Hence, it must be noted that green infrastructure cannot achieve the desired goals unless it is aligned with the overall logistics system in one area. Balancing the objectives of cost-effectiveness and reliability with these overarching development goals can contribute to a better quality of life in the region, improve policy efficiency, mitigate the risk of unintended consequences and position the sector as a model for inclusive development.

6. Conclusion

The logistics and freight transport industries are ones of the most dynamic and important sectors of each economy. Logistics provides a vital “backbone” function in supporting macro-economic processes and the operation of markets, critical infrastructures and distribution to both business and consumers. Market demands increased their bids, which also pushed the inevitable demand for transport services, which enabled an increase in economic movements in the logistics system. In order to reduce the harmful impacts of vehicles, especially trucks in large urban centers, there is a growing need to implement a model called “green logistics”.

Green logistics is necessary to understand the interactions of logistics with the socio-economic system as a whole, enabling sectoral policies to be reconciled with the overarching policy goals of the region. In such an environment, growing industry, such as the logistics sector, plays a key role in the region's long-term sustainable development.

To achieve the goal of green logistics, the overall organization of the transport sector needs to be considered in the broader context of sustainable economic, environmental and social development. It must be borne in mind that all attitudes, initiatives, activities or projections of what would be considered "best practices" to ensure a more sustainable urban distribution must be based on a set of measures in any given urban area and should be designed locally to take into account specific, economic, social and political specificities.

Lastly, the overall intellectual, scientific, and moral capacity of all individuals in the human community must act synergistically and counteract the uncontrolled growth and conquest of space, with the sole purpose of surviving on planet Earth.

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