



Sustainable Development

Policy Paper



KUNSILL NAZZJONALI
TAŻ-ŻGHAŻAGH

YouThink



Table of Contents

Note of Thanks.....	2
Introduction.....	3
Climate Change, Energy and Water Consumption	4
Urban Green Spaces, Urbanisation and Land Grab.....	12
Pollution and Human Health	18
Poverty.....	36
Education for Sustainable Development.....	44
Policy Suggestions.....	48
Works Cited.....	51



Note of Thanks

Many people are behind such a project, and without them this would surely not have been possible. Our thanks goes to:

KNZ President: Michael Piccinino

Youth Services and Rights Officer KNZ : Sara Ezabe

YouThink Policy Paper Team: Sarah Musu', Mario Balzan, Mariella Mercieca, Rosalie Camilleri, Karl Anthony Borg, Veronica Farrugia Drakard, Laura Aquilina, Thomas Cassar Ruggier

Policy Paper Editor: Gianluca Vella Valletta

Design: Adrian Dominic Ellul



Introduction

The main objective of this policy paper is to speculate the way forward while using existing tools and instruments to work sustainably in an environmentally responsible manner. The continuous development has brought with it many positive things and yet it has also created unprecedented challenges, which could be overcome with the effort of the academia, the politicians and the legislation drafters to anticipate, prevent and reduce negative social and environmental impacts. There needs to be a co-operative effort on an International, regional and national level and this can also be seen through the various International Instruments which have been envisaged.

This research was conducted not to stay on shelves, but to be read and scrutinised in order to be criticised where weak and applied where there are strengths. It is divided in a way that provides the reader with a holistic overview of several areas, including climate change, energy and water consumption, urbanisation, pollution and human health, poverty and the overall education of the subject. The main focus being the terrestrial area and suggesting some very interesting recommendations which can inspire change on a national level. That is what makes this piece of research interesting, that it embarks on a journey of challenging that which is already existing to move a step ahead by applying the recommendations which have been suggested. One must therefore take into consideration the fact that the compilation of this report has been done from an objective point of view, whilst taking into account the various reasonable recommendations that have been reviewed in the writing of this report.

To date Kunsill Nazzjonali Taż-Żgħażagħ, has undertaken and reviewed a variety of documents pertaining to the issue at hand, and overall has decided that the best course of action in this regard is to extend its knowledge and research to the governing bodies of the state, in hope that change in favour of a more sustainable level of development is brought about.

A tool for the various stakeholders, to maximise eco-efficiency, to manage risks, failures and potential hazards in an anticipated manner, aiming to avoid environmental pollution and encourage responsible use, re-use, recycling and disposal of our products and by-products, including, when possible, the encouragement of responsible design and facilitate and encourage responsible use.

Kunsill Nazzjonali Taż-Żgħażagħ, has sought to not only share its knowledge with the public and government, but to also put forward policy recommendations put together by the think tank which have an overall positive impact and hopefully shall yield a fruitful outcome in this respect.



Climate Change, Energy and Water Consumption

The term 'climate' refers to the average weather in terms of its mean and its variability over a certain time-span and a certain area. Climate change can be broadly defined as statistically significant change in the state of the climate that can be identified by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer (Solomon et al., 2007). Human-induced climate change is a consequence of human activities, such as the emission of the greenhouse gases or land-use changes, impacting on the climate system. These climatic changes also impact on the human population and result in social and economic change.

International initiatives on climate change mitigation started around the 1969, when the NATO established the Committee on the Challenges of Modern society. The work initiated by the NATO gained international momentum most notably through the Stockholm United Nations (UN) Conference on the Human Environment which was held in 1972 and which conference led to the formation of the UN Environmental Programme. By this time, the initial interest about climate change had turned into a serious concern as it became more evident that a few degrees of global warming could result in alarming rising sea level and important impacts on agriculture, industry and settlements, health and ecosystems which are important fundamentals for the human population (Le Treut et al., 2007).



Later, the World Commission on Environment and Development was set up in 1987, and the notion of sustainable development was first coined. The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 under the auspice of the United Nations Environmental Programme and the World Meteorological Organization. The intention of this international panel was to group scientists and experts to provide a clear scientific view on the current state of climate change and its potential impacts. The organisation, through its 1990 First Assessment report, identified several changes in the climate on a global scale amongst which an increase in the global averages of air and ocean temperatures. These climatic changes have been attributed to the anthropogenic emissions of GHGs. The IPCC also identified the risks of these climatic changes and advocated the stabilisation of the greenhouse emissions to limit the negative impact of global warming (IPCC, 1990).

During the same decade (precisely in 1994), the United Nations Framework Convention on Climate Change (UNFCCC) entered into force as a follow up to the negotiations of the Rio Earth Summit (1992). In this treaty, an international consensus for the stabilisation of greenhouse gas concentrations at a level that would prevent dangerous anthropogenic interferences with climate system was reached (UN, 1992). The Conference of Parties (COP), formed under the umbrella of the UNFCCC, acted as the regulating body and agreed to report greenhouse gas emissions and details about climate change policies and measures.



One of the most notable meetings of COP was held in Kyoto in 1997. This meeting was marked by the first and at the time the only agreement on committing to the reduction of CO₂ and other greenhouse gases. The ratification of such an agreement, which became known as the Kyoto Protocol, faced no smooth course. However, a total of 37 which included the developed nations and economies in transition, agreed to reduce the green-house gas emissions by 5.2% relative to the 1990 levels between the period of 2008 and 2012 (UN, 1998). The Kyoto Protocol, to which a total of 191 countries had signed by 2011, had also brought with it the introduction of several mechanisms aimed at further regulation of emissions and these include the international emission trading, the clean development and the joint implementation mechanisms.

Despite the international efforts and the commitment from many countries, the expectations of the Kyoto protocol to stabilise the GHG levels and prevent global temperature increase were not met (Figure 1).

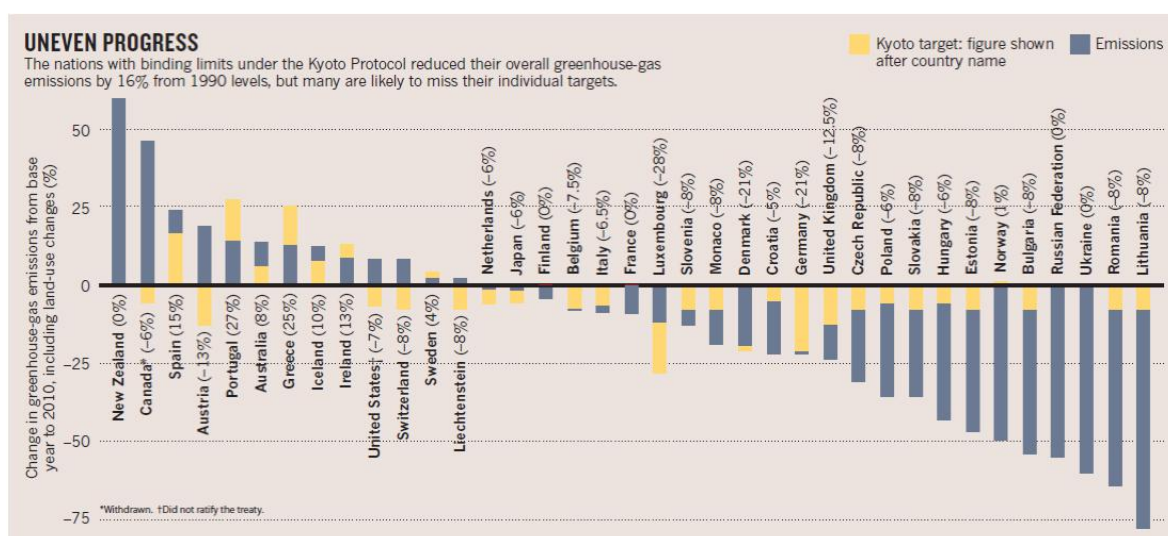


Figure 1

Source: Schiermeier, 2012



Emission reductions in the countries which had ratified the Kyoto Protocol had little effect in the face of the global increase in GHGs. The economic growth in China and other areas of the developing world sent the emissions to a significant 45% increase in 2010 relative to the 1990 levels (Olivier et al., 2016).

The IPCC in its fifth assessment report has given evidence that the total GHG emissions related to anthropogenic activities have continued to increase over the period of 1970 to 2010 with the largest absolute increase occurring between 2000 and 2010 (IPCC, 2014). More than half of the increase in global average surface temperature has been attributed to cumulative anthropogenic activity. Projections also indicate a clear linear relationship between cumulative CO₂ emissions and global temperature increase (Karl and Trenberth, 2003).

Baseline scenarios illustrate CO₂ equivalent GHG concentrations to reach above 1000ppm under conditions of no mitigation and concentrations in the range of 720 and 1000ppm for scenarios which take into account some mitigation measures. For the latter scenario, the IPCC projects that it is unlikely that the global mean temperatures remain below 3°C rise relative to the 1990 levels (IPCC, 2014).

Further evidence on the need for action on the climate change mitigation front comes from the economics perspective.

Stern through his extensive reviews (Stern, 2007) highlights the seriousness of the impacts of warming if the business-as-usual approach to emissions is taken. With such trends the global temperatures are estimated to rise by 2 to 3°C in the next fifty years.



Other than at the international level, predictions of climate change effects have also been made at a more localised level. Such are for example the predictions made for Europe, documented in the work of the IPCC and which include:

- Increase in mean temperatures
- Warming in northern Europe during winter and in the Mediterranean during summer
- Lowest winter temperatures increase more than average temperatures in northern Europe, highest temperatures increase more in summer than average temperatures in southern and central Europe.
- Mean precipitation increase in northern Europe and decrease in most of the Mediterranean area.
- Extremes in precipitation very likely to increase in northern Europe. Increase in risk of summer drought in central Europe and the Mediterranean.
- Changes in wind strength uncertain, although it is more likely that average and extreme wind speed will increase.
- Duration of snow season and snow depth very likely to decrease.



The changes in the global and regional impact on the human population, and are expected to pose, amongst others, one of the 21st century biggest threats to human health. In particular, perils to human health are linked to the increased frequency of weather-driven hazards. The latter are expected to increase disproportionately, affecting two-thirds of the European population annually by the year 2100. The most significant effects will be felt in Southern Europe, where the premature mortality due to weather extremes are project to reach a high of about 700 fatalities per 1 million inhabitants during the period 2071-2100. Deaths from global warming, and in particular the increased frequency of heatwaves, are expected to soar to more than 151,000 annually between 2071 and 2100 (Forzieri et al., 2017).

Climate change in Malta has already been recorded by scientists and policy-makers, with results providing evidence of changes in the pattern of rainfall, an increase in the number of days with thunderstorms per year, decreasing mean annual cloud cover and variations in the amounts of bright sunshine were observed in Malta (Malta Resources Authority, 2013). Table 1 (Source: Malta Resources Authority) below, summarises the expected effects of climate change as estimated to the year 2100:



Table 1.	2025	2060	2075	2100
Increase in regional mean temperature	1.1°C	2.0°C	2.6°C	2.8°C
Change in regional mean precipitation	-2.4%	-4.4%	-3.7%	-1.8%
Change in global mean sea level rise	7cm	14cm	23cm	30cm

Climatic events such as the ones which have been observed and the projected changes in the future climate have serious implications and impacts. Malta is uniquely vulnerable to climate change because of its geography and socio-economic characteristics. The negative implications that a change in climate brings to the islands have been identified. Particularly, the effects on the economy, health, agriculture, land use, migration, tourism and water resources have been analysed (UNFCC, 2014). Further to the overall implications of changes in climate to Malta, the effects of sea level rise on the transport infrastructure were also studied. Given that transport plays an important role in the socio-economic structure of the islands, such a study highlights the economic implications of rising sea-level on employment, product or service growth/decline, capital investment, competitiveness and skills/educational development and upgrade (Attard, 2015).



It is evident that overall climatic changes have a significant effect at the global level. The identified sectoral impacts of climate change in Malta cannot be ignored either. These will profoundly impact, amongst others, our human health, tourism, agriculture, environmental and economy in multiple and complex ways, and potentially leading to several threats to the well-being of the Maltese society

2.



Urban Green Spaces, Urbanisation and Land Grab

In 2007, more than half of the world's population was living in cities. By 2015, the UN predicted 27 “mega-cities” of ten or more million people. (Tzoulas, Korpela et al. 2007) Cities and communities go beyond the simple perception of buildings and busy human activity. Most are endowed with open spaces, which are attractions in their own way, notable of which are the Hyde Park in London and Central Park in New York. Urban green spaces can be simply defined any open piece of land that is undeveloped and accessible to the public. (Wolch, Byrne et al. 2014) Parks, community gardens, public plazas, orchards and other agricultural areas, even cemeteries, all fall under this umbrella.

Green urban areas are important recreational areas for residents that also enhance the environmental quality of the town or city and provide several benefits to the local communities.

Improved air quality, storm water management and aquifer recharge, local climate regulation, biodiversity conservation, aesthetic value, noise pollution reduction, opportunities for food production and higher house prices are just a few benefits arising from the presence of green spaces. Despite the clear benefits arising from the maintenance of open spaces within the landscapes of Malta, these spaces are becoming a scarcer resource particularly in the Southern and Northern Harbour regions. The loss of, in particular, agricultural areas and semi-natural habitats, would in many cases be associated with the loss of these benefits to the Maltese society.

Landscape and urban planning plays an important role in ensuring access to green spaces, and to benefits members of society derive from this. The design of urban green spaces and planning that makes it easy for people to walk, cycle, interact with



one another in a low pollution environment is considered as being critical for human well-being in modern societies. Planning therefore has a key role in reducing today's alarming obesity levels and helping to prevent diseases.

EFFECTS ON HUMAN HEALTH

Access to green spaces and green urban spaces is considered as being critical for human health. These aid general health through access to recreational and sports facilities, by enhancing psychological relaxation, reducing stress levels and depression. A review of evidence by the World Health Organisation's (WHO) Regional Office for Europe (Lee, Maheswaran 2011) spoke of the beneficial effects of green urban spaces, having the ability to aid preventable non-communicable diseases, improving mental health, reducing cardiovascular morbidity and mortality, along with reducing obesity, and type 2 diabetes and cancer risks, and improving pregnancy outcomes. The inclusion of green spaces in our landscapes would thus be expected to drive down health care costs as such diseases are linked to chronic stress and poor lifestyles. (Shortt, Rind et al. 2014) Green urban spaces would cater for physical activity and furthermore improve air quality while reducing exposure to air pollutants, noise and excess heat. It has been said that such green areas would address problems "upstream" through a preventative approach rather than dealing with "downstream" consequences.(Lee, Maheswaran 2011)

In fact, the WHO Action Plan for the implementation of the European Strategy for the Prevention and Control of Noncommunicable Diseases between 2012 and 2016 included the creation of health-supporting urban environments. Green urban areas



could improve the functioning of the immune system, pro-environmental behaviour, improve sleep and provide beneficial exposure to sunlight as it contains the crucial vitamin D which is associated with many health benefits. Such areas may also foster social interactions and promote a sense of community.(Kim, Kaplan 2004) Reduction of the urban heat island effect may be very relevant to the Maltese Islands. It may cause a serious health hazard during heat waves and periods of extreme heat as vegetation is replaced with impervious heat- absorbing surfaces in urban areas, and exposure to such excessive heat is oftentimes linked to increased morbidity and mortality, especially among the elderly.(Smargiassi, Goldberg et al. 2009) Urban parks affect air temperature in urban areas and have a cooling effect, water bodies within the green space offer similar effects. Also, trees can provide shade and reduce the demand for air-conditioning, helping residents avoid heat stress and also reducing energy bills. On the other hand, in cooler climates, trees provide shelter from wind and rain, reducing the demand on heating during cold winters. De Rui et al., in 2014, explored that vitamin D levels obtained from exposure to sunlight were higher among those who engaged in outdoor activities, namely those who cycled or gardened.(Basagana, Sartini et al. 2011)

Nevertheless, there may be exposure to dangerous levels of ultraviolet rays, although it has been reported that it may provide health benefits nonetheless, lowering hypertension and cardiovascular disease. Exposure to light also stimulates alertness and cognition, promoting also healthy sleep.

The adverse effects of urban green spaces include increased exposure to air pollutants and risks of developing allergies and asthma. Furthermore, there would be exposure to pesticides and herbicides along with infections and possibilities of



accidental injuries. Vulnerability to crime is also to be kept in mind. Nevertheless, the beneficial effects outweigh these negative aspects of green urban spaces. Furthermore, it was shown that the quality of such spaces is more relevant, particularly to mental health, than their quantity. It may be said that the attractiveness of a space and the amenities available to partake in physical activity is more important than the number of available open spaces. A study in Ontario, Canada revealed that facilities such as a water area and playground were more important than amenities such as a restroom and picnic areas. (Lee, Maheswaran 2011)

Sustainable urbanisation through provision of such urban areas has economic importance as it relates to urban planners, social services and many other professions. It enhances economic competitiveness of cities since a better quality of life attracts and retains a good workforce and also encourages people to live there, making residential property increase in value, further attracting new residents and investment. Therefore, the economical aspect benefits, along with the social and ecological. Such urban areas also lead to a healthier workforce with higher productivity levels as opposed to those weighed down by obesity and depression. Furthermore, investment in such green spaces creates jobs and enhances tourism. We must also mention the most deprived urban communities, which tend to experience the poorest air quality, greater exposure to heat stress and limited availability of green spaces for recreation and well-being.

Green spaces in urban areas may be especially important for the poorer communities and may help reduce inequalities. Better quality green space appears to be more important than the size of these spaces, and in a recent study it was found that residents were more satisfied with their community in higher quality green



spaces and that these were significantly linked to their overall well-being. (Zhang, Van den Berg, Agnes E et al. 2017)

In Malta, a number of initiatives are being implemented that assess the importance of green spaces for human well-being. The Malta College of Arts, Science and Technology (MCAST) is actively involved in the European Commission's EnRoute (Enhancing Resilience of urban ecosystems through green infrastructure) project, which aims to guide the creation of urban green spaces and enhances policy setting. An EnRoute Conference on 'Evidence-based planning for greener cities' was held at MCAST during the Maltese Presidency of the European Council where the science of mapping and assessment of ecosystems was shown to effect city planning and policy-making so as to enhance the urban quality of life for European citizens. The LifeMedGreenRoof Project, which was set up within the Faculty for the Built Environment at the University of Malta and co-financed by LIFE, seeks to show how such greenery can boost the quality of life in urban areas and produce plenty of benefits. Green roofs provide insulation against heat and hence reduces the use of air conditioning, reduces the carbon footprint, mitigates flooding, foster wildlife and provide recreation space.(Haaland, van den Bosch, Cecil Konijnendijk 2015)

These, and other projects and initiatives, have demonstrated that practices that protect and develop green spaces contribute to human well-being and sustainable development in Malta. A city with accessibility to good-quality green spaces offers recreation, social contact and serves to release stress for urban citizens as it provides room for mobility and closeness with nature, also helping to mitigate heat waves and extreme rainfall or flooding. Hence, an ideal city would have healthier



KUNSILL NAZZJONALI TAŻ-ŻGHAŻAGH
50, LION STREET, FLORIANA, FRN1513, MALTA
21 245 376 | INFO@KNZ.ORG.MT

citizens, contributing to a stronger workforce and decreasing the pressure placed on health services.



Pollution and Human Health

INTRODUCTION

Human impact on the environment has resulted a growing concern when it comes to what can be called a “cause-and-effect relationship”, putting the health of individuals at risk as a result. Consequently, pollution is one of the key areas to be considered in this regard when referring to traits that are not presupposed to form part of our ecosystem; a way of contaminating our environment through matter or energy, therefore causing detriment to surroundings.

Amongst various interpretations of what pollution constitutes, the Environment Management Act for British Columbia defines pollution as; “... the presence in the environment of substances or contaminants that substantially alter or impair the usefulness of the environment.”.

It is important to highlight that the right to an adequate environment is also a fundamental right embedded in various conventions and has been discussed in the international arena by various organisations such as the World Health Organisation. It is therefore a right that ought to be safeguarded.



AIR POLLUTION

Air pollution refers to contaminants present in the air which result in increased mortality and hospitalisation of individuals, and which are mostly released through industrial facilities. In the early 1970s the link between air pollution and health concerns was as yet unknown and it was only in the 1990s that new research suggested the hazards of such pollutants (Thron, 1996).

Photochemical air pollution is also of global concern. In addition, health impacts may depend on the length of exposure and on the specific individual being considered. Pollutants have proven to be harmful to the respiratory system - causing lung inflammation and lung cancer - the nervous system, the urinary system and the digestive system amongst others. The monitoring of pollutants in our environment is a requirement of national and the European Union policy and legislation. This is considered as being critical in order to identify areas that are more at risk of an erosion of human health due to the presence of pollution sources.



WATER POLLUTION

Water is one of the most important resources available since it is essential to the basic well-being of individuals. As a result, water pollution is of great risk to human health. Water pollution is a result of different pathogens and chemicals, which can occur naturally or through anthropogenic means, causing sanitation concerns and risks to agriculture and aquatic life. Moreover, it may also be caused by untreated waste, dumping of industrial effluent and pesticides or fertilisers in run-off from fields. Pesticides, for example, harm the nervous system and can also lead to cancer. Lead, fluoride, salts, nitrates and petrochemicals are all pollutants which are of detriment to health in various ways, including spinal cord damage, pregnancy risks and even skin cancer.

Polluted water may result in a higher incidence of disease. Pathogens may enter water bodies either directly or indirectly via organisms. Water pollution is more of a risk where there is poor sanitation, and therefore it is more common in regions of the world where sanitation and pollution control standards are lax. China is a case in point; since the advent of industrialisation, the lack of infrastructure in the water system has left great devastation.

Taking action to limit water pollution will require a variety of coordinated approaches. These may include the management of water resources, education regarding clean environments, and regular monitoring and enforcement procedures.



TERRESTRIAL POLLUTION

Terrestrial pollution causes destruction of the Earth's land surfaces in a variety of ways, including inadequate waste regulation, chemicals in soil and over-exploitation of mineral resources. Unfortunately, illegal dumping of waste is still a predominant problem in Malta. This waste is a health liability to current and future generations due to chemicals leached out and the impact on our biodiversity and environment. For example, plastic contains acrylic and polycarbonate, both of which are hazardous and could lead to skin diseases, cancer and respiratory diseases.

The most common soil pollutants in Europe are heavy metals and mineral oils; however, pesticides and fertilisers are also common. Health is at risk through various modes of intake, such as inhalation, skin contact and also through the ingestion of plants and agricultural livestock. Arsenic, asbestos, cadmium and various other chemical are all forms of soil pollution, and could lead to cardiovascular disease, lung cancer, kidney disease and a decrease in attention span.

NOISE POLLUTION

Noise pollution can be broadly defined as “unwanted sound”, and while it is a lesser known form of pollution it is nonetheless an environmental stressor which poses



significant risks to human health. The effects of noise pollution are generally considered to fall into two main categories. *Auditory effects* relate directly to the functioning of the hearing organ or to the masking of auditory information. Therefore, hearing impairments due to the influence of sound energy on the inner ear and communication problems due to persistent environmental noise can both be classified as auditory effects (Stansfeld and Matheson, 2003).

Various studies have suggested, however, that environmental noise can also result in *non-auditory effects*; that is, ill health other than hearing impairment. The mechanisms of this remain mostly unknown, as levels of persistent environmental noise are generally low and therefore any effects on non-auditory health cannot be explained as a consequence of sound energy. Stress is often identified as an alternative vector, as persistent noise disturbance may result in increased levels of stress, which leave the body vulnerable to illness (VanDijketal.,1987).

The non-auditory effects of noise pollution are of three major kinds. The first and most obvious involves sleep disturbance, as increased exposure to noise both increases the rate of changes in sleep stages and the number of awakenings (Stansfeld and Matheson, 2003). While subjects may acclimatise to lower-level disturbances, one study indicated that this may become impossible as environmental noise increases (Öhrström, 1989).

This may result in an increase in blood pressure and heart rate (Stansfeld and Matheson, 2003). Finally, it has been postulated that exposure to environmental noise may result in psychological effects and eventual psychiatric disorder as a



consequence of continual stress; a study conducted in Delhi indicated that annoyance and depression are common psychosomatic effects observed in this regard (Singh and Davar, 2004). This is a complex issue, however, and it has proven difficult to isolate a consistent link between levels of noise and mental health status (Stansfeld and Matheson, 2003).



LIGHT POLLUTION

Over the course of the 20th century, large areas of the globe have come under the influence of artificial light at night, both due to direct illumination and due to ‘*sky glow*’, which is the diffuse scattering of light in the atmosphere (Bennie *et al.*, 2014). This is a direct result of humanity’s expanding global presence and expenditure of energy. The ever-increasing use of light at night may appear to be common sense: humans are diurnal animals attempting to extend activities into dark hours, and in many cases artificial light is necessary for safety reasons (Falchi *et al.*, 2011). Lighting levels in public areas, for example, are typically high as a deterrent against crime. However, assuming that human beings have become adapted to a diurnal cycle, it logically follows that artificial changes to this cycle will have drastic fitness effects. Indeed, a growing body of scientific evidence indicates that light pollution can be detrimental to both human and wildlife health. Exposure to artificial light during the night has the potential to disrupt an individual’s 24- hour day/night cycle, known as the circadian clock.

This will affect multiple physiological processes, including brain wave patterns, hormone production and cell regulation. In particular, studies have shown that exposure to artificial light for more than one hour can decrease melatonin levels in the circulation (Navara and Nelson, 2007). Melatonin regulates a variety of physiological processes and has the ability to protect against oxidative stress and diseases resulting from oxidative attack; therefore, its suppression could magnify the amount and results of oxidative damage, which can include damage to immune cells,



elevated incidence of cancer and an increase in rate of physiological aging (Navara and Nelson, 2007).

Exposure to extended levels of artificial light can also result in metabolic disruption; studies have suggested that individuals working on a shift basis (and who are therefore regularly exposed to light pollution by virtue of working during dark hours) experience detrimental effects to carbohydrate and lipid metabolism and increased risk of hypertension, coronary heart disease and myocardial infarction (Smolensky, 2006).

It is therefore clear that there is an urgent need for light pollution policies that encompass not only energy efficiency, but also human well-being, the structure and function of ecosystems and any related socioeconomic consequences (Hölker *et al.*, 2010). A number of policies have been proposed to limit the effects of light pollution; these address intensity, duration and direction of lighting. For example, it has been suggested that luminaires should not be allowed to send any light directly at or above the horizontal, and that the short wavelength 'blue' light should be strongly limited (Falchi *et al.*, 2011).



THERMAL POLLUTION

Thermal pollution is defined as a change in environmental temperature as a result of anthropogenic activity, such as in the case of coolant discharge from industry (when water is used as a coolant), or in the case of urban heat islands. While the effects of this on human health are not immediately obvious, they are nevertheless significant.

Human health has been shown to have a marked sensitivity to the thermal environment: a study conducted in Germany indicated that during summer, death rates rise sharply with increasing heat load and reach peak values during pronounced heatwaves (Laschewksi and Jendritzky, 2002). This effect is likely to be pronounced under conditions of urbanisation due to the influence of the urban heat island (UHI) phenomenon, as these tend to exacerbate thermal stress (Tan *et al.*, 2010). UHIs can potentially increase the magnitude and duration of heat waves within cities and may be particularly harmful at night as they deprive their residents of the cooler temperatures of rural areas (Tan *et al.*, 2010). In considering the concept of the sustainable city, the thermal consequences of urbanisation must therefore be kept in mind and measures should be taken to decrease the degree of heat retention in urban areas.

CONCLUSION



In conclusion, it is clear that human health and pollution are inextricably linked, regardless of the form or duration of contaminant being considered. As we exist within the global environment, any changes or alterations to this environment will necessarily impact humanity. It is clear that research is ongoing and there is a wealth of knowledge available to inform policy decisions in this regard; however, none of this should be taken for granted. As the environment changes, so should we progress in collecting data and making new inferences with regards to pollution; in this way, we will be able to build holistic, resilient policy frameworks which will be a reference point for many years to come.



Traffic Congestion

‘Transport is an essential part of our daily life’ as it enables us to interconnect with people in the fastest way possible. Through transportation communities and countries are able to communicate economically, socially and politically. This makes the transport sector a strategic part of every country’s economic structure as human communication and accessibility ‘affects economic development by influencing the relations between resources, businesses, services and customers’. Like other countries, Malta has benefitted from transportation and its modernisation. However, Maltese are now becoming witnesses of unintended and unwanted problems from transportation as a result of the increasing number of privately owned vehicles, the Maltese road network has become bloated with constant traffic congestions.

The country’s geography and demography are largely to blame for this situation. Having only an area of 316 km², it is inhabited by a population of approximately 430,000 people. It is therefore natural for a country as small as Malta with a population density of 1,360 people per km² would succumb to such frustrating traffic congestions. However, these are not the only factors in play. During the past 60-50 years, our country has seen significant changes in the economic and social fronts, changes which have determined the nature of our economy and the traditional model of Malta’s family structure. In which thousands of low-skilled jobs substituted with more value-added and lucrative employment, with the tourism industry replacing Malta’s redundant role as a fortress harbour economy, and women entering the workforce. This provided Maltese individuals and families with an increase in disposable income.



Even though Maltese people have reaped the benefits of economic and social prosperity. These developments have also brought about challenges like traffic congestions.

This situation as it seems, has not been met with an adequate response. According to the former Transport and Infrastructure Minister Joe Mizzi, the road infrastructure we use today is the same one used 28 years ago, and so, the increasing volume of traffic has not been met with a modernised infrastructure network, which has increased the likelihood of traffic. Moreover, Malta's Public Transport sector is failing to meet the needs of modern society. This reached its peak when Arriva took over and worsened the situation. Consequently, with more money in the people's pockets, they began to opt for their own vehicles as faith in Public Transport collapsed.

The increase in affluence of the Maltese worker and the inadequate service of the Transport sector therefore contributed to rise in car ownership since the 1990s. A trend which has led to 20% of households having more than three cars and a trend which for a long time has not been met with policy changes. This is now leading to unwanted outcomes in the form of air pollution, health problems and reduced economic efficiency amongst others. The future is not promising either, as it is as it is projected that by the year 2050, Malta's population would stand between 453,095 – 474,759 people. Moreover, it is also projected that by the same year, Malta will also host around 2.7 million tourists. This will undoubtedly continue to place severe pressure on Malta's limited infrastructure.



Negative Effects on Malta

The reason why people use transportation is to reach a destination in the fastest and most efficient way possible. Malta's Public transport service is not a first choice for Maltese given its insufficient service. Therefore, a probable decrease in public transport patronage and an increase in the human population in Malta over the years makes privately owned cars the most viable option for transportation at present.

(78 Hauptman, Benjamin 2002)

However, with time, and due to Malta's small size, high population density and limited infrastructure it is becoming increasingly evident that the use of privately owned vehicles is becoming an inefficient (though still more efficient than Public Transport) option while the population continues to increase mainly through the settling of foreign residents and the country's attractiveness in the tourism market.

The severe traffic congestions and lack of parking spaces due to the volume of cars and limited infrastructure is costing the country time. Time which people could use to gain access to services and time which people can use to work. Needless to say, the loss in time is affecting the businesses and consumers in an economic point of view, thus affecting the country's productivity. According to a study referred to by the government's Transport Strategy document, the economy is currently losing out around €200 Million from its GDP. It must also be considered that traffic congestion is also affecting the environment as it pollutes the air, by contributing 21.1% of Greenhouse gas emissions, and also reducing the quality of life in urban areas. As



mentioned before, the situation is not likely to improve given if we go on as business as usual. If this becomes the case, then the current factors contributing to Malta's traffic problems will continue as usual. While Malta's traffic woes worsen, so to would the economic losses and with that the environmental loss. Which would both affect the quality of life and the standard of living. It is projected that Malta's economic losses would stand by 2050 at around €1.3 Billion, which would be equivalent to 8.2% of the GDP. Without doubt Malta is feeling the pinch the persistent traffic congestions effectively making it one of the main problems of Malta.



What has been done?

Malta's transportation deficiencies have been developing ever since the country began experiencing considerable change. This does not mean that these deficiencies cannot be solved. In a study conducted by a group of researchers from the University of Malta, we are provided with a suitable local example where recent government have successfully curbed traffic growth, which is the country's capital, Valletta. In the study, it noted that from 1998 till 2010, the number of bus trips to 'Valletta wen up from 46.1% to 57% while private cars plummeted from 50.9% to 40.7%'. Before these figures were given, the study mentions that in Floriana the first Park and Ride scheme was introduced, and in 2007 the CVA system was launched in Valletta. Showing that care proper planning can help solve Malta's situation. Even though Malta saw a bundle of success it obviously was not enough to cure its traffic illness and in 2011 the country began to suffer from a public transport disaster.

For the past few years, the independent media dedicated articles in discussing traffic congestions in the Island. This also led to a response from the country's principle political parties. With the opposition offering proposals of its own and the ruling party in government attempting to make good of its promise in the 2013 election to solve situation. In the last legislature, with Arriva replaced by Autobus de Leon, the public transport service was completely revamped. The bendy-busses were taken of the roads, the '*tallinja car*' system was developed, and more busses were being bought for the company to serve as much people as possible. These changes 'registered an unprecedented 24 per cent increase in bus patronage' as claimed by the former Transport Minister.



Moreover, the government also sought to improve junctions, install intelligent transport management systems, continued and finished the coast road project and began the Kappara fly-over, and also offered to provide young people who turned 18 in 2017 with free public transport in the 2017 budget. The Transport Master Plan for 2025 and the National Transport Strategy for 2050 were prepared and issued.

An analysis on 'all modes of transport for internal and international transport'. Focusing on 'the needs of the country (both Malta and Gozo), identifying problems and seeking to understand what we expect to face in future – short, medium and long term. With the aim of developing a long-term vision. The Master Plan for example, aims to improve roads, build new ones, incentivise public transport use and encourage sustainable mobility.



Possible Solutions

The Chamber of Commerce, which had expressed concern regarding the socio-economic costs of traffic, although it supported the government's attempts and plans to control the volume of cars it also voiced its disappointment that the government in the last budget offered very little initiatives with measures based on the National Transport Strategy and Transport Action Plan. This gives the impression that not enough has been done on traffic congestions if taken from the view point of the Chamber of Commerce. The same feelings can also be said with the Maltese population. In October 2016, Malta Today published a survey indicating that traffic concerns reached an all-time.

This naturally leads us to the question on 'how we can reduce traffic congestions?' Previous administrations have already attempted to address the problem. But as every Maltese can say, all these measures till now have proven to be futile and that more needs to be done.

The Malta Business Bureau CEO Joe Tanti looks at Copenhagen and Romania when considering what Malta should do to reduce its car volumes. Copenhagen, according to him, is on the track in 'becoming one of the biggest cycling regions in the world' through the building of a network of cycle super highways. Tanti himself admits that this example is a bit of a longshot for the country, but his example emphasises the need that Malta needs to dedicate more infrastructure for cycling. Romania, Tanti's other example, embarked on a sustainable mobility campaign for students and teachers called 'I walk to school'. The CEO also continued that Malta should have its own car-free centres, an idea which is being embraced by cities like Madrid, Hamburg, Paris and Copenhagen.



This however would be a difficult task given that Maltese have grown addicted to their cars, but this would all depend on the general mood of the public and how the idea has been presented to them. The re-introduction of the railway in Malta's transport system was also an option which was afloat for a few months. Yet one must consider the costs of building and effect on the areas were the railway would be placed.

Whilst direct government intervention is an essential ingredient in the change of transportation, another important force would be the invisible hand of the free market. The Chamber of Commerce believes that the country should have a sustainable plan which involves 'the private sector through Public Private Partnerships. Taxi sharing is also a service which could help reduce the reliance of private cars by offering people a flexible public transport service, with UBER being the most famous example.

Concluding remarks

Malta's Traffic situation is a puzzle which will prove very difficult to solve. As we do not only have certain physical, demographic and economic factors against us but also our own attitude which is our addiction to drive a car. Nonetheless, measures need to be taken if we are to directly change the transport system, but the Maltese people must be willing to change their attitude and help out in this transition. The broadening of national expertise within this area is however deemed as being critical to ensure that new solutions, which are backed up by evidence, are developed and adopted by communities.



Poverty

“Fundamentally, poverty is a denial of choices and opportunities, a violation of human dignity. It means lack of basic capacity to participate effectively in society. It means not having enough to feed and clothe a family, not having a school or clinic to go to, not having the land on which to grow one’s food or a job to earn one’s living, not having access to credit. It means insecurity, powerlessness and exclusion of individuals, households and communities. It means susceptibility to violence, and it often implies living on marginal or fragile environments, without access to clean water or sanitation”.

(UN Statement, June 1998 – signed by the heads of all UN agencies)

There is a difference between absolute and relative poverty. Absolute poverty has been defined as a condition characterised by severe deprivation of basic human needs, including food, safe drinking water, sanitation facilities, health, shelter, education and information. It depends not only on income but also on access to services. Relative poverty can occur in different forms including ‘lack of income and productive resources to ensure sustainable livelihoods; hunger and malnutrition; ill health; limited or lack of access to education and other basic services; increased morbidity and mortality from illness; homelessness and inadequate housing; unsafe environments and social discrimination and exclusion. It is also characterised by lack of participation in decision making and in civil, social and cultural life.

It occurs in all countries: as mass poverty in many developing countries, pockets of poverty amid wealth in developed countries, loss of livelihoods as a result of economic recession, sudden poverty as a result of disaster or conflict, the poverty of

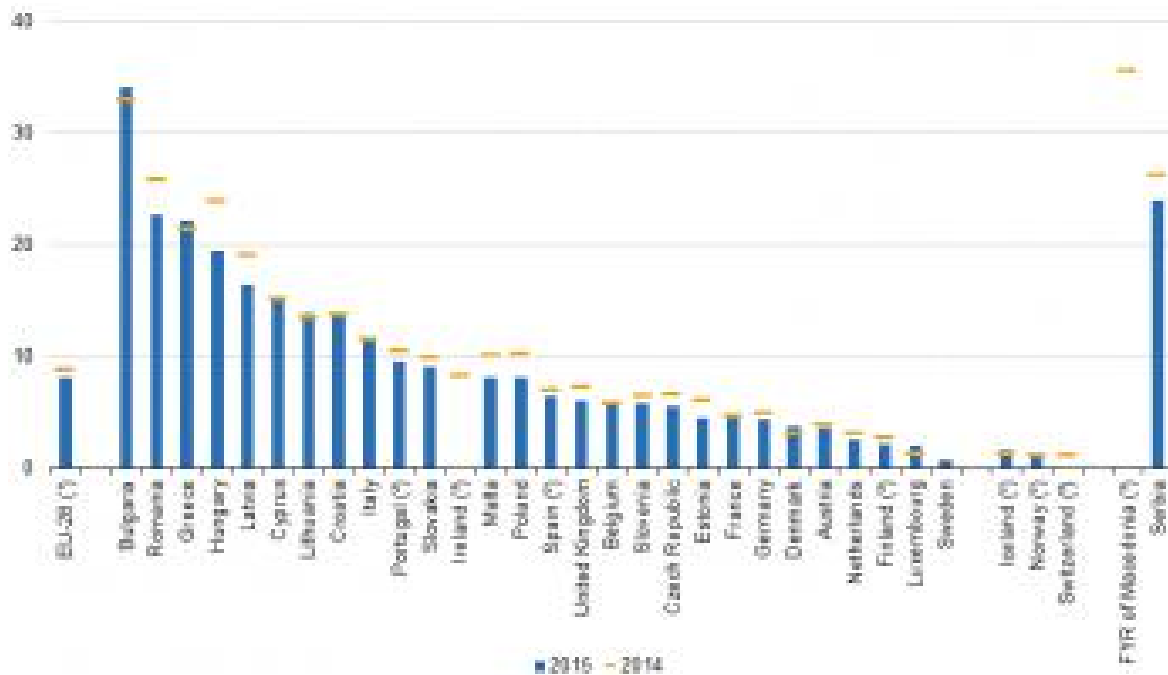


low-wage workers, and the utter destitution of people who fall outside family support systems, social institutions and safety nets.'

One of the five headline targets of the Europe 2020 headline indicators is to reduce the amount of people at risk of poverty and social exclusion by at least 20 million people by 2020.

Material deprivation rates complement the social exclusion picture by providing an estimate of the proportion of people whose living conditions are severely affected by a lack of resources. The severe material deprivation rate represents the proportion of people who cannot afford at least four of the nine following items:

1. having arrears on mortgage or rent payments, utility bills, hire purchase instalments or other loan payments;
2. being able to afford one week's annual holiday away from home;
3. being able to afford a meal with meat, chicken, fish (or vegetarian equivalent) every second day;
4. being able to face unexpected financial expenses;
5. being able to buy a telephone (including mobile phone);
6. being able to buy a colour television;
7. being able to buy a washing machine;
8. being able to buy a car;
9. being able to afford heating to keep the house warm.



(*) 2015: estimate.
(*) 2015: provisional
(*) 2015: not available

Source: Eurostat

As one can see from the graph above, Maltese people are at a low risk of poverty. Several factors may account for this. One of them is the close proximity of family who are able to contribute if the family is passing through a difficult financial period.

Youth unemployment has also registered a decline, and in this area Malta is doing better than EU28 (http://ec.europa.eu/eurostat/statistics-explained/index.php/Unemployment_statistics). This is essentially the fruit of a policy to ensure that school leavers have the necessary skills to take up employment. Problems persist since school leavers are not always equipped with the right skills for gainful employment and early school leaving remains a major concern. In Malta one does not witness poverty on the streets, but it does exist. In recent years, major efforts have been undertaken to reduce both the at-risk-of-poverty levels and the



material deprivation levels, with an element of success. The two most at-risk groups are single mothers and the elderly.

A number of initiatives to assist the first group to move into the economy, primarily through free childcare for those working or undergoing training, are bearing positive results. Similarly, the very recent changes in the minimum state pensions have pushed many up the scale rather than further down, especially as the cost of rents increases.

In this sphere the role of transfer payments cannot be underestimated: many Maltese have come to depend on them, and it is hoped that there will never be any need to reduce them since, as an ex-Prime Minister recently commented, one has to be wary of their eventually becoming too heavy a burden to carry.

Even so, pensions remain low, and although a contributory ‘two-thirds’ pension scheme exists, in reality the two-thirds label is fiction since the pension is capped at a very low level. In view of this, an effort is being made to encourage people in the private sector to continue working beyond the official retirement age. Paradoxically these incentives are denied to workers in government service or to those working in institutions that preclude government interest.

Malta has benefited substantially from EU funds and sizable amounts have been dedicated to projects aiming to improve skills and benefit disadvantaged persons. The Maltese have participated very actively in projects and one can easily see that in various areas ESF funds have had positive effects. The elderly in particular are being offered support from EU funds to remain in the community rather than retire to



a home through a special project in which the government part-pays for the services of a qualified live-in carer.

People who do not own their own properties and rent are at a higher risk of poverty. Rents have been increasing across the board as the economy prospers and demand for letting increases as a result of an influx of foreign workers. The phenomenon can also be witnessed in Cospicua, known for cheap rental housing, where the prospect of a private university campus at Dock 1 has already started pushing rents up. A recent Caritas study, which mapped out the adequate income for a decent living, only took into consideration the cost of annual rent for government social accommodation. This amounts to some €200 per year but with no social housing units available many have to rent in the private sector where rents are significantly higher. Increasing rental prices is one of the foremost issues in the social sphere and it requires immediate attention.

There are more than 3,000 people on the waiting list for social housing and although the government has announced plans to build hundreds of units, it will still be some time before any become available.

Meanwhile, these people have to rent in the private sector and are at the mercy of market forces that have pushed rents up, particularly over the past four years.

Figures obtained by the National Statistics Office show how the average monthly price of a single bedroom apartment shot up by 38 per cent between 2012 and 2015.



The increase is eye-watering when one considers that the annual rate of inflation in 2013, 2014 and 2015 was hovering around the one per cent mark.

The rental sector has operated in an unregulated free market since 1995 when rent laws were first changed to do away with archaic laws introduced just after World War II intended to give tenants long-term security at the expense of landlords.

Year	3 bedrooms	2 bedrooms	1 bedroom
2015	€1,023	€796	€605
2014	€984	€693	€490
2013	€903	€635	€458
2012	€833	€618	€437

Size of a three-bedroom ranges between 110 and 130 square metres, a two-bedroom between 80 and 100 square metres and a one-bedroom between 40 and 60 square metres.

Source: NSO

Children are one of the population groups who are at a higher risk of poverty. Around 21,000 Maltese children are estimated to be at risk of poverty. This amounts to 28.2 per cent of the total population. The figures refer to 2015 and are worse than the figures in 2010 when children at risk constituted 26.7 per cent of the total population.



On a scale, the Maltese children at risk of poverty are higher than the EU average, which stands at 26.9 per cent. These figures are published last November by Eurostat, the statistical office of the European Union, on the occasion of the Universal Children's Day celebrated on 20 November

In 2015, around 25 million children, or 26.9% of the population aged 0 to 17, in the European Union were at risk of poverty or social exclusion.

This means that they were living in households in at least one of the following three conditions: at-risk-of-poverty after social transfers (income poverty), severely materially deprived or with very low work intensity.

A total of 21,000 children are classified as being at risk of poverty. The figure belies all boasts about the economy of Malta growing by leaps and bounds and being the best growing economy in Europe.

Behind this figure there stand an unquantified number of families at risk of poverty where either there is no one to get home a wage or elsewhere for any reason (such as illness) whatever wage, social assistance, etc the head of the family gets is palpably insufficient for the needs of the family.

A vicious circle then kicks in – poverty means lack of motivation to do well at school, which in turn leads the next generation to repeat the tragic history of the first one, hence generating generations upon generations of children at the risk of poverty

And the situation, despite all boasts to the contrary, is getting worse: at least percentage-wise.



KUNSILL NAZZJONALI TAŻ-ŻGHAŻAGH
50, LION STREET, FLORIANA, FRN1513, MALTA
21 245 376 | INFO@KNZ.ORG.MT

Our country has over the years thrown millions and millions to help alleviate poverty. However, our research has documented that the poverty problem remains far from solved. Only by breaking the vicious cycle of poverty at the very beginning, one can ensure that the percentage of the Maltese population at risk of poverty decreases in the future.



Education for Sustainable Development

The important role of education in providing opportunities for improving quality of life, employment, and awareness of environmental issues.

Introduction

The building of Sustainable Cities and fostering a culture of sustainability when it comes to development is the end result of an educational process. Even though sometimes overlooked, education, whether formal, informal or non-formal, is essential to ensure that the past and present gains from sustainability remain relevant in the future, whilst avoiding any previous mistakes.

Educating people on sustainable development is an important part of the Agenda 21 document published by the United Nations. This voluntary action plan, agreed during the UN Conference on Environment and Development held in Brazil back in 1992, has been central to start the conversation on education, public awareness and training. Section four of the document goes further into detail how critical education is, including formal education, as a way to improve the capacity of the people to create sustainable living environments (Agenda 21, 1992).

This became known as 'Education for Sustainable Development' or ESD for short, and since then has been included into most school curricula. However, this is an ever-changing subject with new information, targets and problems that need to be reached or tackled. Economic growth is important to reduce the levels of poverty; however, this growth must also be used to address inequality and has to be sustainable in order to be feasible in the long term.



Education and Sustainable Development in Malta

Sustainability relates not only to the environment, but also to the preservation of the integrity of nature, eradication of poverty, and removal of social injustices. Hence, a holistic approach has been recommended in order to ensure education for sustainable development (Briguglio and Pace, 2004). The authors go on to say that these developments are essential to the benefit of the current and future generations, and that collaboration between the various educational and environmental institutions is considered as being critical.

The University of Malta and the Malta College of Arts, Science and Technology offer various further and higher educational courses on sustainable development and the environment. A number of Non-Governmental Organisations also offer various formal and informal education opportunities on the topic.

Briguglio and Pace (2004) also note that during this time, the locals are given more opportunities for public participation in decision-making related to the approval of development projects. However, despite this increase in potential public participation, the vast majority of the public lacked the technical knowledge to understand the data being presented in reports such as the Environmental Impact Assessment reports and also lacked the logistical knowledge of how to form effective pressure groups in order to oppose or stand by certain development projects.

One can notice, however, that from 2004 till 2017, improvements have been registered when it comes to the organisation of effective pressure groups in Malta.



This was and still is aided by the creation of online social networks such as Facebook and Twitter, as well as the increasing use of smartphones and applications such as WhatsApp. Whereas before, locals could only count on newspapers, television and radio stations and costly websites, these new social applications made it free and easier for them to communicate and connect with each other. This has increasingly led to people being able to air their opinions spontaneously on development projects taking place and finding peers with the same views. Thus, the creation of pressure groups became easier and one can clearly see how during these years, there has been an increasing number of these groups, including 'Front Harsien ODZ' and the online group 'Leave Pembroke Alone'.

'Front Harsien ODZ' was created in 2015 as a response to the declared development of the American University of Malta on an Outside Development Zone (ODZ), in an area known as Zonqor in Marsascula. The activities held by this pressure group, including the biggest environmental rally in Malta, resulted in partial backtracking by the Government, which decreased the size of the project on ODZ land. A more recent example is the creation of an online group, 'Leave Pembroke Alone', which was formed after the announcement of a development project by a private school in Malta, Chiswick House School. This development project is planned to take place on open public land, which angered the locals, many of which use it for their everyday walk, and led them to create a Facebook online group by the same name. The online group is proving to be very active, with people showing their objection to the development as well as photos of what would be lost, should this take place. This



initiative has been further strengthened with the help of public meeting organised by the locals and the Local Council. This meeting was held on site of the proposed development project in August 2017 and Environment Minister Jose Herrera, was among the 300 attendees.

Conclusion

Even though ESD has now been incorporated in the formal education sector, one can notice that Malta still lacks a properly integrated ESD policy. The current approach is more focused on informing students and teachers on environmental awareness rather than the “fostering of sustainable development values” (Briguglio and Pace, 2004), which unfortunately has not changed since 2004.

In order to remedy this, ESD must not only be included into formal education as a separate subject but should also form part of all the other subjects that are taught at primary, secondary and even tertiary levels. When it comes to informal and non-formal education, NGOs, private businesses and the media should take a forefront position in fostering public awareness about sustainable development through media networks, whilst encouraging direct participation for the public when it comes to environmental decision-making fora.

The KNZ strongly favours initiatives that promote education for sustainable development and that mainstream this into the formal and informal educational experience of citizens. This, coupled with the promotion of active participation in the decision-making on development projects is essential to build sustainable cities that care for both current and future citizens.



Policy Suggestions

Having discussed the key challenges that our country is facing in the protection of our environment, the conservation of Malta's unique biodiversity and natural capital, the KNZ has come up with a number of policy recommendations.

Theme	Policy recommendation
Climate Change, Energy and Water Consumption	Provide economic incentives for the production and use of renewable energy in Malta Provide economic incentives for rainwater harvesting, greywater recycling and other incentives that will reduce water consumption by households and the industry



<p>Urban Green Spaces, Urbanisation and Land Grab</p>	<p>No net loss of natural capital</p> <p>Integrate green infrastructure for human well-being in local plans.</p> <p>Restoration of degraded areas to promote the conservation of biodiversity and human well-being</p> <p>Partnering with academic institutions, such as the University of Malta and the Malta College of Arts, Science and Technology (MCAST) to develop new solutions that may be implemented in cities</p> <p>Ensure strong participation by all stakeholders in the co-design of cities that provide adequate green infrastructure for children the poor and disadvantaged groups.</p>
<p>Pollution, Traffic Congestion and Human Health</p>	<p>Promote walking, cycling, car sharing and other initiatives that reduce private car use;</p> <p>Enhance the local public transport network to provide an alternative but efficient way of travelling to the public;</p> <p>Ensure a strong enforcement of the law to limit emissions from private vehicles and various industries;</p> <p>Ensure a strong enforcement of the law to limit illegal waste dumping</p>



<p>Poverty</p>	<p>Increasing disposable income for a good standard of living.</p> <p>Land Lord Tax Benefits; Allowing social landlords to reduce rents at the benefit of tax reductions for affordable rent.</p> <p>Promoting activation and creating more quality employment opportunities.</p> <p>Ensuring equal access to quality health care and a health friendly environment -</p> <p>Promoting inclusive, further and higher education.</p> <p>Consolidating social services to promote social solidarity and social cohesion - Promoting a more inclusive culture.</p> <p>Expand and improve services tied to housing assistance, in particular by better integrating employment-related incentives and services.</p>
<p>Education for Sustainable Development</p>	<p>Mainstream education for sustainable development into the formal and informal educational experience of citizens;</p> <p>Promote active stakeholder participation in environmental decision-making;</p>



Works Cited

- BASAGANA, X., SARTINI, C., BARRERA-GOMEZ, J., DADVAND, P., CUNILLERA, J., OSTRO, B., SUNYER, J. and MEDINA-RAMON, M., 2011. Heat waves and cause-specific mortality at all ages. *Epidemiology (Cambridge, Mass.)*, **22**(6), pp. 765-772.
- BENNIE, J., DAVIES, T.W., DUFFY, J.P., INGER, R. and GASTON, K.J., 2014. Contrasting trends in light pollution across Europe based on satellite observed night time lights. *Scientific reports*, **4**, pp. 3789.
- BREVIK, E., CERDÀ, A., MATAIX-SOLERA, J., PEREG, L., QUINTON, J., SIX, J. and VAN OOST, K., 2015. The interdisciplinary nature of SOIL. *Soil*, **1**(1), pp. 117.
- BRIGUGLIO, L., 2003. The ethical dimension in the national strategy for sustainable development, *International Conference on Sustainability Indicators 2003*.
- BRIGUGLIO, L. and PACE, P.J., 2004. Education for sustainable development in Malta, *Fourth World Environment Education Congress, Durban 2004*, pp. 2-6.
- BRUNEKREEF, B. and HOLTGATE, S.T., 2002. Air pollution and health. *The lancet*, **360**(9341), pp. 1233-1242.
- FALCHI, F., CINZANO, P., ELVIDGE, C.D., KEITH, D.M. and HAIM, A., 2011. Limiting the impact of light pollution on human health, environment and stellar visibility. *Journal of environmental management*, **92**(10), pp. 2714-2722.
- FIRDAUS, G. and AHMAD, A., 2010. Noise pollution and human health: a case study of municipal corporation of Delhi. *Indoor and Built Environment*, **19**(6), pp. 648-656.
- FRAME, T.M., GUNTON, T. and DAY, J., 2004. The role of collaboration in environmental management: an evaluation of land and resource planning in British Columbia. *Journal of Environmental Planning and Management*, **47**(1), pp. 59-82.
- HAALAND, C. and VAN DEN BOSCH, CECIL KONIJNENDIJK, 2015. Challenges and strategies for urban green-space planning in cities undergoing densification: A review. *Urban Forestry & Urban Greening*, **14**(4), pp. 760-771.
- HAUPTMAN, B. and HAUPTMAN, A., 2002. *Method and apparatus for reducing traffic congestion*.
- HAUS, E. and SMOLENSKY, M., 2006. Biological clocks and shift work: circadian dysregulation and potential long-term effects. *Cancer causes & control*, **17**(4), pp. 489-500.
- HÖLKER, F., MOSS, T., GRIEFAHN, B., KLOAS, W., VOIGT, C.C., HENCKEL, D., HÄNEL, A., KAPPELER, P.M., VÖLKER, S. and SCHWOPE, A., 2010. The dark side of light: a transdisciplinary research agenda for light pollution policy. *Ecology and Society*, **15**(4).
- KIM, J. and KAPLAN, R., 2004. Physical and psychological factors in sense of community: New urbanist Kentlands and nearby Orchard Village. *Environment and Behaviour*, **36**(3), pp. 313-340.
- KRISTENSEN, P., 2004. The DPSIR Framework. National Environmental Research Institute, Denmark. European Topic Centre. *European Environment Agency*,.
- LASCHEWSKI, G. and JENDRITZKY, G., 2002. Effects of the thermal environment on human health: an investigation of 30 years of daily mortality data from SW Germany. *Climate research*, **21**(1), pp. 91-103.
- LEE, A.C. and MAHESWARAN, R., 2011. The health benefits of urban green spaces: a review of the evidence. *Journal of public health*, **33**(2), pp. 212-222.



MARCHWINSKA-WYRWAL, E., DZIUBANEK, G., HAJOK, I., RUSIN, M., OLEKSIUK, K. and KUBASIAK, M., 2011. Impact of Air Pollution on Public Health. *The impact of air pollution on health, economy, environment and agricultural sources*. InTech,.

MEAKIN, S., 1992. *The Rio earth summit: summary of the united nations conference on environment and development*. Library of Parliament, Research Branch.

NAVARA, K.J. and NELSON, R.J., 2007. The dark side of light at night: physiological, epidemiological, and ecological consequences. *Journal of pineal research*, **43**(3), pp. 215-224.

ÖHRSTRÖM, E., 1989. Sleep disturbance, psycho-social and medical symptoms—a pilot survey among persons exposed to high levels of road traffic noise. *Journal of Sound and Vibration*, **133**(1), pp. 117-128.

PACE, P., 1997. Environmental education in Malta: Trends and challenges. *Environmental Education Research*, **3**(1), pp. 69-82.

POGGIO, L., VRŠČAJ, B., SCHULIN, R., HEPPELLE, E. and MARSAN, F.A., 2009. Metals pollution and human bio accessibility of top soils in Grugliasco (Italy). *Environmental Pollution*, **157**(2), pp. 680-689.

POPE III, C.A. and DOCKERY, D.W., 2006. Health effects of fine particulate air pollution: lines that connect. *Journal of the Air & Waste Management Association*, **56**(6), pp. 709-742.

SCHWARZENBACH, R.P., EGLI, T., HOFSTETTER, T.B., VON GUNTEN, U. and WEHRLI, B., 2010. Global water pollution and human health. *Annual Review of Environment and Resources*, **35**, pp. 109-136.

SHORTT, N.K., RIND, E., PEARCE, J. and MITCHELL, R., 2014. Integrating environmental justice and socioecological models of health to understand population-level physical activity. *Environment and Planning A*, **46**(6), pp. 1479-1495.

SINGH, N. and DAVAR, S., 2004. Noise pollution-sources, effects and control. *Journal of Human Ecology*, **16**(3), pp. 181-187.

SMARGIASSI, A., GOLDBERG, M.S., PLANTE, C., FOURNIER, M., BAUDOUIN, Y. and KOSATSKY, T., 2009. Variation of daily warm season mortality as a function of micro-urban heat islands. *Journal of epidemiology and community health*, **63**(8), pp. 659-664.

STANSFELD, S.A. and MATHESON, M.P., 2003. Noise pollution: non-auditory effects on health. *British medical bulletin*, **68**(1), pp. 243-257.

TAN, J., ZHENG, Y., TANG, X., GUO, C., LI, L., SONG, G., ZHEN, X., YUAN, D., KALKSTEIN, A.J. and LI, F., 2010. The urban heat island and its impact on heat waves and human health in Shanghai. *International journal of biometeorology*, **54**(1), pp. 75-84.

TZOULAS, K., KORPELA, K., VENN, S., YLI-PELKONEN, V., KAŻMIERCZAK, A., NIEMELA, J. and JAMES, P., 2007. Promoting ecosystem and human health in urban areas using Green Infrastructure: A literature review. *Landscape and Urban Planning*, **81**(3), pp. 167-178.

VAN DIJK, F., SOUMAN, A. and DE VRIES, F., 1987. Non-auditory effects of noise in industry. *International archives of occupational and environmental health*, **59**(2), pp. 133-145.

WOLCH, J.R., BYRNE, J. and NEWELL, J.P., 2014. Urban green space, public health, and environmental justice: The challenge of making cities 'just green enough'. *Landscape and Urban Planning*, **125**, pp. 234-244.

WU, C., MAURER, C., WANG, Y., XUE, S. and DAVIS, D.L., 1999. Water pollution and human health in China. *Environmental health perspectives*, **107**(4), pp. 251-256.



ZHANG, Y., VAN DEN BERG, AGNES E, VAN DIJK, T. and WEITKAMP, G., 2017. Quality over quantity: Contribution of urban green space to neighbourhood satisfaction. *International journal of environmental research and public health*, **14**(5), pp. 535.

DE CHAZOURNES, L.B., 1998. Kyoto protocol to the united nations framework convention on climate change. *UN's Audio-visual Library of International Law* (<http://untreaty.un.org/cod/avl/ha/kpccc/kpccc.html>), .

NIELSEN, O., PLEJDRUP, M.S., WINTHER, M., NIELSEN, M., GYLDENKÆRNE, S., MIKKELSEN, M.H., ALBREKTSEN, R., THOMSEN, M., HJELGAARD, K. and HOFFMANN, L., 2014. *Denmark's National Inventory Report 2014: Emission Inventories 1990-2012-Submitted under the United Nations Framework Convention on Climate Change and the Kyoto Protocol*. Aarhus University, DCE-Danish Centre for Environment and Energy.

ABRELL, J., 2010. Regulating CO2 emissions of transportation in Europe: A CGE-analysis using market-based instruments. *Transportation Research Part D: Transport and Environment*, **15**(4), pp. 235-239.

BARON, R., BUCHNER, B. and ELLIS, J., 2009. Sectoral approaches and the carbon market.

BARRY, J., ELLIS, G. and ROBINSON, C., 2008. Cool rationalities and hot air: a rhetorical approach to understanding debates on renewable energy. *Global environmental politics*, **8**(2), pp. 67-98.

CHANGE, INTERGOVERNMENTAL PANEL ON CLIMATE, 2007. Climate change 2007: The physical science basis. *Agenda*, **6**(07), pp. 333.

DEN ELZEN, M., FEKETE, H., HÖHNE, N., ADMIRAAL, A., FORSELL, N., HOF, A.F., OLIVIER, J.G., ROELFSEMA, M. and VAN SOEST, H., 2016. Greenhouse gas emissions from current and enhanced policies of China until 2030: Can emissions peak before 2030? *Energy Policy*, **89**, pp. 224-236.

HELM, D., 2014. The European framework for energy and climate policies. *Energy Policy*, **64**, pp. 29-35.

KARL, T.R. and TRENBERTH, K.E., 2003. Modern global climate change. *Science (New York, N.Y.)*, **302**(5651), pp. 1719-1723.

PACHAURI, R.K., ALLEN, M.R., BARROS, V.R., BROOME, J., CRAMER, W., CHRIST, R., CHURCH, J.A., CLARKE, L., DAHE, Q. and DASGUPTA, P., 2014. *Climate change 2014: synthesis report. Contribution of Working Groups I, II and III to the fifth assessment report of the Intergovernmental Panel on Climate Change*. IPCC.

PROTOCOL, K., 1997. United Nations framework convention on climate change. *Kyoto Protocol, Kyoto*, **19**.

SOLOMON, S., QIN, D., MANNING, M., CHEN, Z., MARQUIS, M., AVERYT, K.B., TIGNOR, M. and MILLER, H.L., 2007. Contribution of working group I to the fourth assessment report of the intergovernmental panel on climate change, 2007.

SOLOMON, S., QIN, D., MANNING, M., CHEN, Z., MARQUIS, M., AVERYT, K.B., TIGNOR, M. and MILLER, H.L., 2007. Contribution of working group I to the fourth assessment report of the intergovernmental panel on climate change, 2007.

SOTO, I., SÁNCHEZ, B., GÓMEZ-BARBERO, M., FELLMANN, T. and RODRÍGUEZ-CEREZO, E., 2017. Datasets on technological GHG emissions mitigation options for the agriculture sector, *Workshop proceedings. JRC Conference and Workshop Reports. Luxembourg: Publications Office of the European Union* 2017.



STERN, N., 2008. The economics of climate change. *American Economic Review*, **98**(2), pp. 1-37.

TEGART, M.W., SHELDON, G. and GRIFFITHS, D., 1990. Climate Change: The IPCC Impacts Assessment Report prepared for Intergovernmental Panel on Climate Change by Working Group II. *Canberra: Australian Government Publishing Service*. 連結.

Websites Cited

<http://www.maltachamber.org.mt/en/putting-a-stop-to-malta-s-traffic-congestion>

<https://www.timesofmalta.com/articles/view/20150918/opinion/cost-of-traffic-congestion.584840>

<http://www.independent.com.mt/articles/2016-10-11/blogs-opinions/Addressing-traffic-congestion-6736165010>

<http://www.independent.com.mt/articles/2017-01-23/local-news/Traffic-congestion-costs-Malta-200-million-will-worsen-by-2050-if-nothing-changes-Joe-Mizzi-6736169459>

<http://www.maltarail.org/congestion.html>

http://www.maltatoday.com.mt/news/national/79021/minister_says_lija_roadworks_will_reduce_traffic_congestion_similar_works_planned_for_other_zones#.WagWQ8gjHIU

file:///C:/Users/thoma/Downloads/TRANSPORT%20STRATEGY.pdf

https://www.um.edu.mt/__data/assets/pdf_file/0006/188592/Adrian_Muscat_2.pdf

<https://www.timesofmalta.com/articles/view/20160518/local/pns-35-traffic-proposals-unveiled.612465>

<http://www.transport.gov.mt/transport-strategies/strategies-policies-actions/national-transport-strategy-and-master-plan>

http://www.maltatoday.com.mt/news/data_and_surveys/70359/maltatoday_survey_concern_on_traffic_reaches_alltime_high#.WbBlAsgjHIU

http://www.maltatoday.com.mt/comment/editorial/78768/breaking_our_addiction_to_cars#.WbBnkMgjHIU

<http://www.businessinsider.com/cities-going-car-free-2017-2?IR=T/#hamburg-is-making-it-easier-not-to-drive-4>