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Research Article

The Impact of Global Environmental Change on Transport in Malta

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Abstract. This study addresses the impact of global environmental change, specifically on transport in the Maltese Islands, with special attention to the economic implications of changes on: (i) employment, (ii) product or service growth/decline, (iii) capital investment, (iv) competitiveness and (v) skills/educational development and upgrade. Geographic and economic data from secondary sources are used to support the study. The paper addresses the concerns of environmental change on the islands of Malta and attempts to map the extent of potential damage to the islands' transport system, namely the impact of sea level rise and extreme weather events. Geographic Information Systems (GIS) are used to build a Digital Elevation Model (DEM) of the islands and simulate the effects on the road network, maritime installations and air transport infrastructures that are critical for Malta's economy and sustainability. The paper also describes the implications of such impacts. Results show that a significant share of the islands' infrastructure could be heavily damaged and the transport systems easily disrupted from predicted impacts of global environment change. The paper concludes with a call for the adoption of sustainable transport measures which address not only mitigation but also adaptation to global environmental change.

Keywords: Malta, transport, sea level rise, extreme weather events

1 Introduction

Global environmental change is perhaps the most significant challenge of the 21st century and as populations across the globe struggle with extreme weather events and the impacts of increased pollution, the risks associated with global environmental change remain uncertain and heavily debated (Doran & Zimmerman, 2009). Even the reports calculating future damages and judgements about adaptation and mitigation measures for climate change differ widely (Stern, 2007; Tol, 2006). These uncertainties have unfortunately justified inaction and postponed regulatory action on many environmental issues, including climate change (Jacques, Dunlap & Freeman, 2008; Lewandowsky, Oreskes, Risbey, Newell & Smithson, 2015). This paper focuses on the impact of global environmental change on transport systems. It specifically deals with changes affecting transport systems in the islands of Malta and the economic implications on: (i) employment, (ii) product or service growth/decline, (iii) capital investment, (iv) competitiveness and (v) skills/educational development and upgrade.

There is a relatively small body of literature that over the recent years has looked at the impact of global environmental change on transport. Much of the research has focused on aspects related to climate change mitigation, the central issue being the effectiveness and efficiency of measures to reduce the environmental burden of transport systems (Hensher & Button, 2003). This paper will, possibly for the first time, focus on the changes that will significantly affect Malta's transport system and associated infrastructures. The changes that the paper will take into consideration include sea level rise, extreme weather events (including storm surges, precipitation and flooding, wind gusts), changes in seasonal weather patterns (including increase and decrease in very cold or very hot temperatures) and drought. The paper will look at the various infrastructures that make up the island's transport system including the airport, seaports and roads.

The research was primarily conducted using Geographic Information Systems (GIS) and geographic datasets from various sources. The Digital Elevation Model (DEM) for Malta was obtained from the European Environmental Agency (http://www.eea.europa.eu/data-and-maps). Other datasets, such as the

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information about valleys and streams were extrapolated from the DEM. The road network was developed under the STREETS Project which was part-funded by the Italia-Malta Programme (2012–2015), and the location of the main airport and port infrastructures were digitised. Using spatial interpolation, different surfaces (affected areas) were produced to simulate the level of sea level infiltration at various elevations. Due to the resolution of the DEM, the study was limited to estimating at the lower level a 1 m sea level rise. Overlay techniques were then used to identify the parts of the road network which intersect with valleys and streams, usually the first areas to be affected during heavy rainfall (and flash flooding). This approach allowed for the identification of infrastructure that would be negatively impacted by both an increase in sea level and the increase in events of heavy rainfall. Other secondary sources including the National Statistics Office were used to support the findings of the study.

Section 2 of this paper provides some basic definitions and context on the issue of Global Environmental Change whilst Section 3 gives an overview of the transport system in the islands of Malta. Section 4 explains the impacts of global environmental change on the five specific sectors identified earlier. Section 5 provides some conclusions.

2 Global Environmental Change: Definitions and Impact

Global environmental change is a broad term used to describe a number of future scenarios which scientists over the past decades have identified as mainly a result of anthropogenic activities which have negatively affected the natural environment (MIMCOL, 2003). Significant events have already occurred as early as the 1980s and 1990s with the discovery of the ozone hole, acid rain and the increase in greenhouse gases in the atmosphere (and subsequently global warming). Since then, awareness has increased amongst the international community; but very little has happened, leading to an increase in the speed at which processes such as climate change and sea level rise are predicted to occur (Hulme, 2009; IPCC, 2014).

The predicted climate change effects in Europe have been documented through the work of the Intergovernmental Panel on Climate Change (IPCC) and include:

- Slightly higher increase in mean temperatures than the global mean.
- Warming in northern Europe largest in winter, for the Mediterranean largest in 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 (Christensen et al., 2007).

With these predicted changes in mind, governments are being required to monitor and report emissions through Greenhouse Gas Inventory Systems (Malta Resources Authority, 2014), action measures that mitigate these emissions and develop adaptation strategies to prepare for climate change impacts (e.g. Climate Change Committee for Adaptation, 2010).

The following sections will focus on the case study by first looking at the transport infrastructure and second, assess the impacts of global environmental change on transport in Malta.

3 Transport Systems Development in Malta

Malta's transport system can be traced back to developments under British rule. Historically, Malta was a British naval base with an ideal location in the middle of the Mediterranean Sea. This position, coupled with deep, sheltered natural ports, made Malta an important and strategic colony for the British Empire. The British built ports, airports, roads, a railway and also trams up until the 1930s. Subsequently, the railway and trams ceased to operate as the bus and the private car offered more flexible and efficient access. Roads covered all historical infrastructures and the car took over the road system (Lanfranco, 1999). Following independence, the Maltese Government invested heavily in the construction of an extensive road network, a new airport, upgraded port infrastructures in the Grand Harbour and eventually reclaimed land from the sea and constructed the Freeport in Marsaxlokk Harbour. More recently, the port infrastructures connecting the two main islands of Malta and Gozo (at Ċirkewwa and Mġarr respectively) were also upgraded. As part of the Trans-European Transport Network (TEN-T), the Maltese Government is upgrading the main transport infrastructure to ensure connectivity with the rest of the European Union (European Commission, 2014). Table 1 shows a set of socio-demographic and transport indicators for Malta between 2000 and 2010. These show primarily a high population density, a high private car ownership, an extensive road infrastructure and a growing potential for economic development from both maritime and air transport related services.

Table 1: Main socio-demographic and transport indicators for Malta. Adapted from Attard and Mifsud (2013).

Description of Indicator	**2000**	**2010**
Total land area (incl. Gozo and Comino)	316 km^2	316 km^2
Percentage of built-up land	23.6%	26.5%
Population	391,415	417,617
Population density per km^2 of built up area	5,275	4,983
Licensed vehicles on the road	246,825	304,705
Percentage private vehicles	75%	76%
Private passenger vehicles per 1,000 inhabitants	473	555
Estimated annual vehicle km for private vehicles	9,000 km	9,840 km
Share of car as percentage of all trips	70%	71%
Length of road network	2,227 km	2,254 km
Estimated number of vehicles per km of road	111	135
Public transport modes	bus, ferry, taxi	bus, ferry, taxi
Malta International Airport passenger movements	3 million	3.3 million
Number of Vessels entering Malta	917	11,511
Tonnage of Vessels entering Malta	17.7 million	114.6 million
Cruise liner passenger traffic	–	491,201
Cruise liner calls	–	275
Inbound tourists	1.2 million	1.3 million

This section described briefly the main transport infrastructures which are critical for the sustained economic development of the islands.

(i) *Air Transport*

An island state with no physical connection to the mainland renders it heavily dependent on the provision of air services and air transport infrastructures to secure a link to the rest of the world. Malta has one international airport which recorded just over 4 million passenger movements in 2013. The infrastructure saw over 28,000 planes arriving and departing within the same year, with a strong seasonality effect that is primarily driven by the changes in tourist arrival and departure on the islands (which is still highest during the summer months). The airport also handled just over 16,000 tonnes of cargo (Malta International Airport, 2014). The security of this infrastructure is vital for the carriage of both passengers and freight. The infrastructure is also identified as a critical link in the Scandinavian-Mediterranean Corridor established by the European Commission for the successful development of the Trans-European Transport Network (TEN-T) (European Commission, 2014).

(ii) *Sea Transport*

Malta's geo-strategic position within the Mediterranean continues to support the development of sea transport industries. This is coupled with the advantage of two natural ports which lend themselves to the movement of large ships (container and more recently cruise liners). The Ports of Valletta and Marsaxlokk (Freeport) are part of the TEN-T network, with each having a critical role for the movement of passengers and goods to Malta but also in a wider Mediterranean and global logistics network.

Ċirkewwa and Mġarr Harbours provide the necessary infrastructure for the existing ferry service operating between the two islands of Malta and Gozo. The coastline is also dotted with small harbours and landing infrastructure for fishing vessels, pleasure crafts and large yachts. This study however takes into consideration only major infrastructures and does not include those which support small local industries. It is however important to investigate these further to assess potential implications on small and medium size enterprises which are intrinsically linked to such places.

(iii) *Land Transport*

Malta has an extensive road network with over 2,228 km of roads, out of which only 3 per cent are considered major roads (including the TEN-T Network). Figure 1 shows the main road network in the island. The infrastructure grew organically over the years especially during the 80s and early 90s, with the last major developments being completed at the end of the last century. Up until

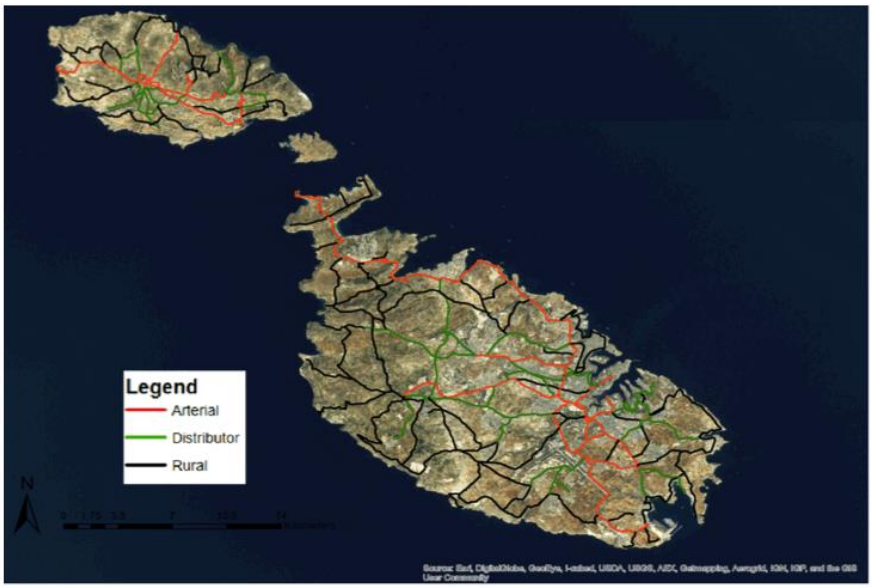


Figure 1: Main Road Network for the Malta by type of road. Source: ICCSD (2014).

then, the growth in the number of roads occurred in parallel with the growth in the car population in the island. This reflected the predict-and-provide philosophy that subsequent Maltese governments adopted over the years following independence (Attard, 2005).

Similar to other countries, the growth in motorisation has reflected the growth in GDP. Malta is today the country with the world's fifth highest density of road vehicles per population. The dependence of the economy on an efficient transport system has also grown over time, even though growth is now being threatened by congestion (JRC (Joint Research Centre), 2012) and increasing external costs (Attard, Von Brockdorff & Bezzina, 2015).

4 Implications of Global Environmental Change on Transport

Malta's latest National Communication submitted in April 2014 to the United Nations Framework Convention on Climate Change (UNFCCC) is the most recent and comprehensive report which identifies the overall implications of climate change on the islands (United National Framework Convention for Climate Change (UNFCCC), 2014). This report, alongside other data compiled for the purposes of this paper, will be used to assess the implications of global environmental change on transport. Table 2 summarises the main changes expected in the island region for 2025 until 2100 for temperature, precipitation and sea level rise. These three indices are considered the most important aspects of future climate change.

Changes to the local climate have already been observed and have been documented by Malta Resources Authority (2014). These have had, and will continue to have, significant implications on transport. The changes that have been recorded include:

Table 2: Main model results generated using MAGICC/SCENGEN version 5.3 applicable to the region of the Maltese Islands for the years 2025, 2050, 2075 and 2100. Source: Malta Resources Authority (2014).

	2025	**2050**	**2075**	**2100**	**Comments**
Increase in Temperature (°C)	1.1	2.0	2.6	2.8	Regional Mean
Change in Precipitation (%)	-2.4	-4.4	-3.7	-1.8	Regional Mean
Sea Level Rise (cm)	7	14	23	30	Global Mean

– during the rainy season, the number of days per year with thunderstorms has increased by nine since 1950;
– the existence of convective rainfall is corroborated by the positive trend in the daily maximum rainfall between 1923 and 2000, since this type of rainfall is of short duration and often heavy;
– an increase in the daily maximum rainfall is observed notwithstanding the fact that, over a full year, the absolute number of days with rainfall in the range 1–50 mm is decreasing;
– the recorded decrease in the mean annual cloud cover over Malta amounts to −0.3 oktas[1] since 1965;
– the duration of bright sunshine has decreased by an average of 0.6 hours per day since 1923 (Malta Resources Authority, 2014).

4.1 Impact of sea level rise and flooding on the road network

Some of Malta's major link roads in the network have been constructed near the coast and in low-lying areas (valleys) which are naturally prone to flooding and will be severely impacted by sea level rise. Figure 2 shows the location of areas prone to sea-level rise near the coast. The increase in the number of surfaced roads (and therefore run-off following rain) has compounded the flooding problem by removing any absorptive capacity of the ground during rain events. Msida, Birkirkara, Balzan, Marsa and Qormi are some examples of areas which will require considerable investment to remove the flooding threat. Figure 3 shows the location of areas prone to flooding.

The percentage of links affected by sea level rise was calculated (Figure 2). It is evident that even a 2 m sea level rise will make 6.3 per cent of the total main road network (including arterial, distributor and rural roads) inoperable, with the highest threat to arterial and rural roads. The impact is obviously higher with a 5 m and 10 m sea level rise.

The location of these links is also of concern as they are mostly in built up areas which include a substantial amount of tourism infrastructure (hotels and tourist facilities) in Sliema/St. Julian's in the North Harbour Region, and St. Paul's Bay in the North of the Island, and then industrial installations in the South of the Island. These infrastructures include access to main critical resources such as power generation plants (both Marsa and Delimara power stations) and ports.

A similar analysis was carried out to identify the areas prone to flooding. A layer of intermittent streams and rivers was extrapolated from the elevation map of Malta and Gozo and the main roads were overlaid to identify the number of links prone to flooding, particularly during extreme weather events or heavy rains. The percentage of arterial roads prone to flooding was estimated at 10 per cent, whilst 6 per cent of distributor roads and 7 per cent of rural roads would be prone to flooding. Figure 3 displays the location of these roads.

In 2012, the State embarked on a €56 million flood relief project partly funded by the European Union, to intercept rainwater through a series of underground tunnels and the replacement and re-organisation of culverts and bridges. The project is also aimed at replenishing the national water reserve with a further 700.000 m^3 of water a year (Ministry for Transport and Infrastructure, 2015).

4.2 Impact of sea level rise on port infrastructure

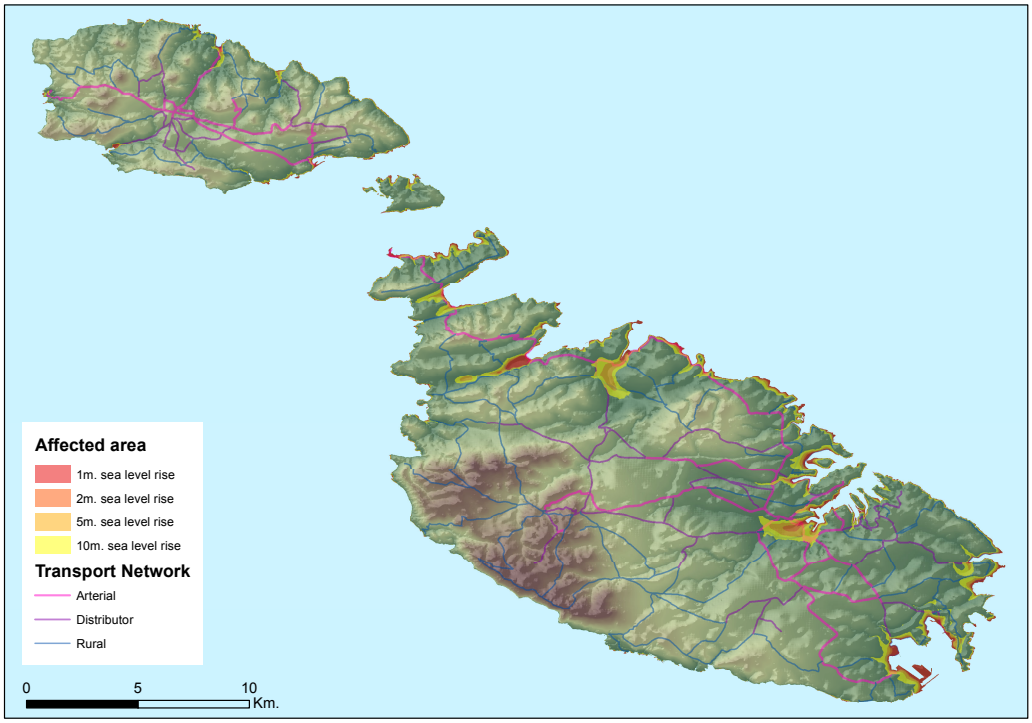
As previously described, Malta's port infrastructures are critical for the movement of goods and passengers. The port of Valletta is particularly important to the tourism industry with the increasing cruise liner sector; whilst the Freeport, in the port of Marsaxlokk, is an important trans-shipment hub within the wider Mediterranean network. Figure 4 shows the impact of various levels of rise in sea level on both ports, as well on the adjacent road infrastructure linking the ports to the rest of the islands.

Already at 1 m there is significant impact on the transport infrastructures in these port areas. In addition to the main ports, the implications of sea level rise on the ports of Ċirkewwa in Malta and Mġarr in Gozo – which serve as the only link between the islands – are significant. Given the value of these areas for the islands, not only in terms of residential build-up but also, more importantly for the economy, sea level rise is set to have a significant bearing on the islands' future.

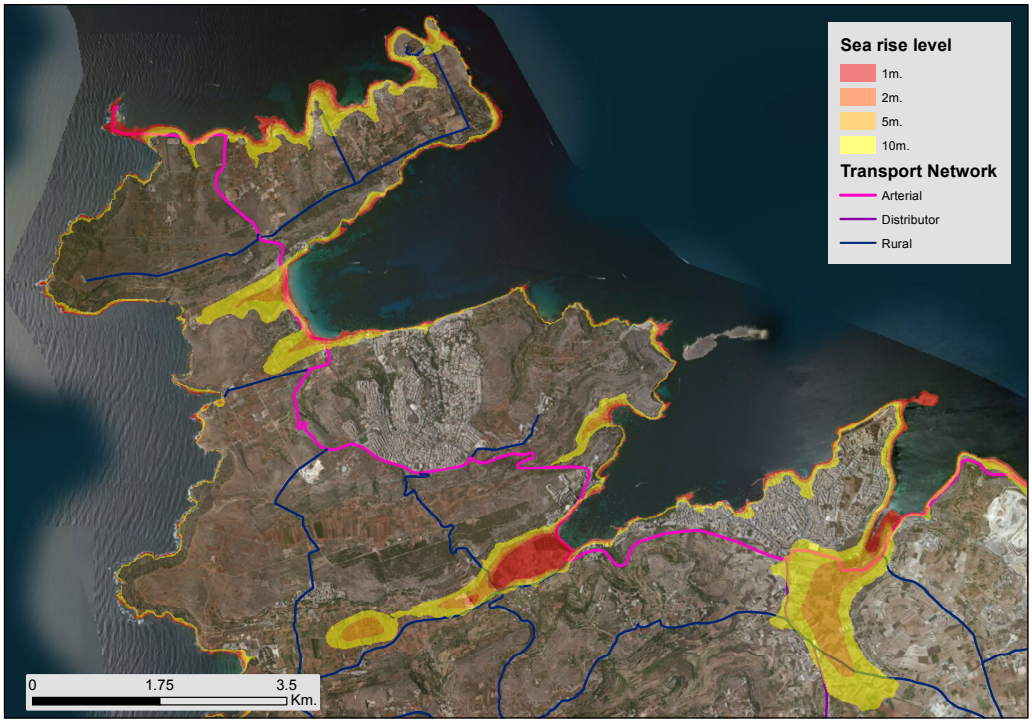
Additional infrastructure, which would be heavily impacted by such sea level rise, includes the yacht marinas which are found primarily in Marsamxett Harbour and the Grand Harbour. Yachting has been a particularly lucrative sector within Malta's economy, with demands for more berthing spaces increasing from year to year. In 2007, Government had already identified this sector as a growing opportunity for the islands, with yachting infrastructure featuring prominently in both the Grand Harbour and Marsamxett Harbour Reports (MIMCOL, 2007b, 2007a).

These findings have also potential implications on the recent proposals by Government to implement a permanent link between the islands, as well as other plans to reclaim land. Most relevant to our discussion is however the permanent link (a bridge) between Malta and Gozo. The feasibility needs to take into consideration not only the economic, social and environ-

[1] Okta - A unit used in expressing the extent of cloud cover, equal to one eighth of the sky.

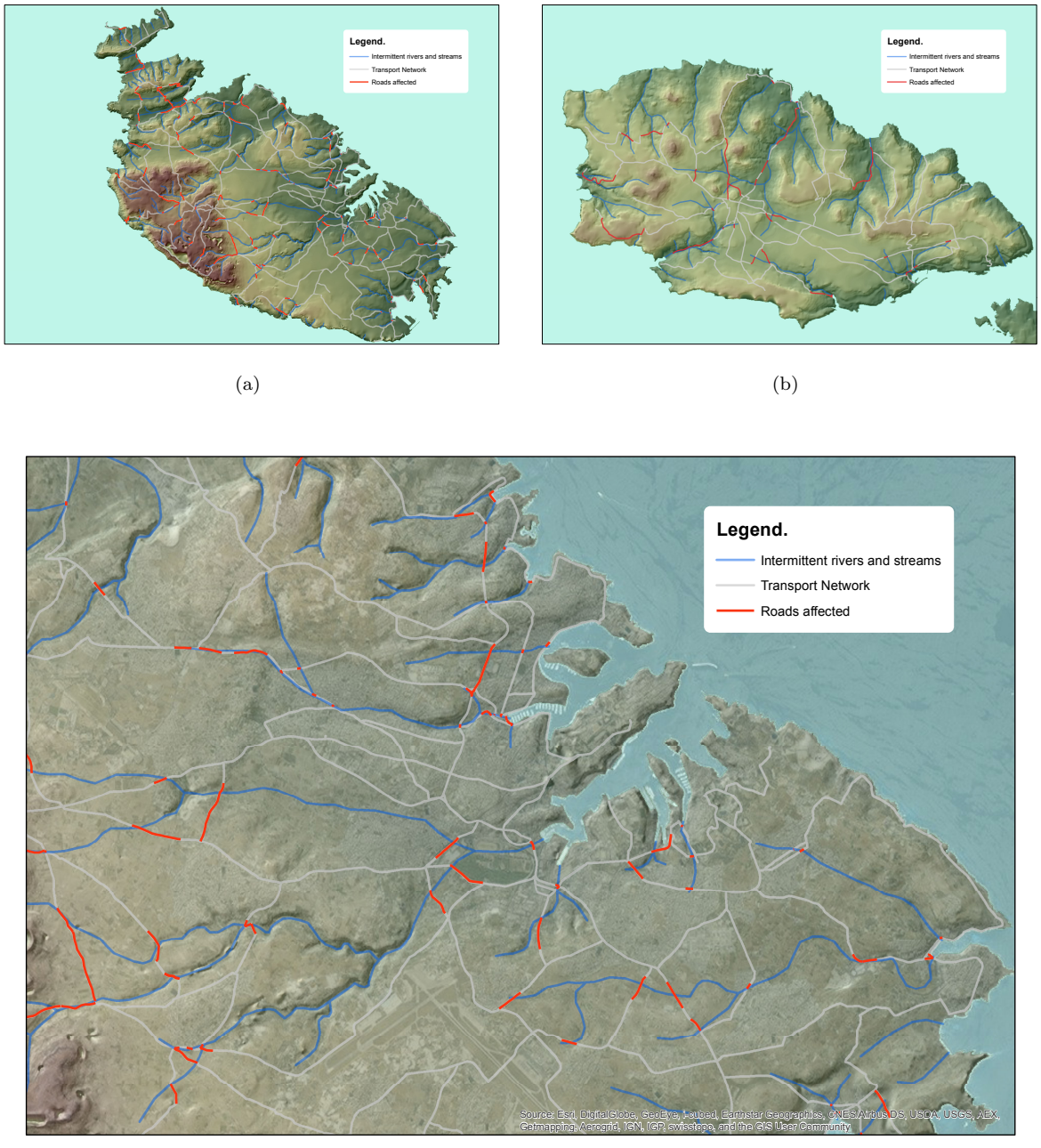


(a)



(b)

Figure 2: (a) Coastal areas and main roads affected by sea level rise. With a 2 m sea level rise, 5.3% of arterial roads, 2.3% of the distributor roads and 9.2% of the rural network would disappear. With an unlikely 5 m sea level rise, 24% of the main road network would be affected. (b) A detail of the northern part of the island of Malta showing the extent of impact of sea level rise on the main infrastructure.

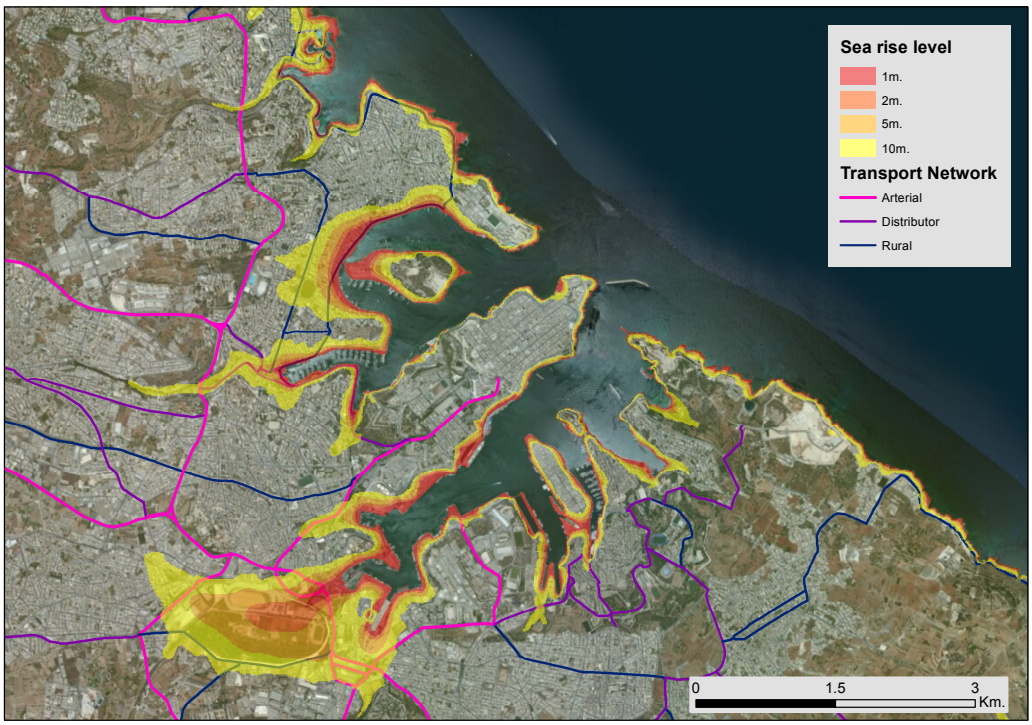


(a)

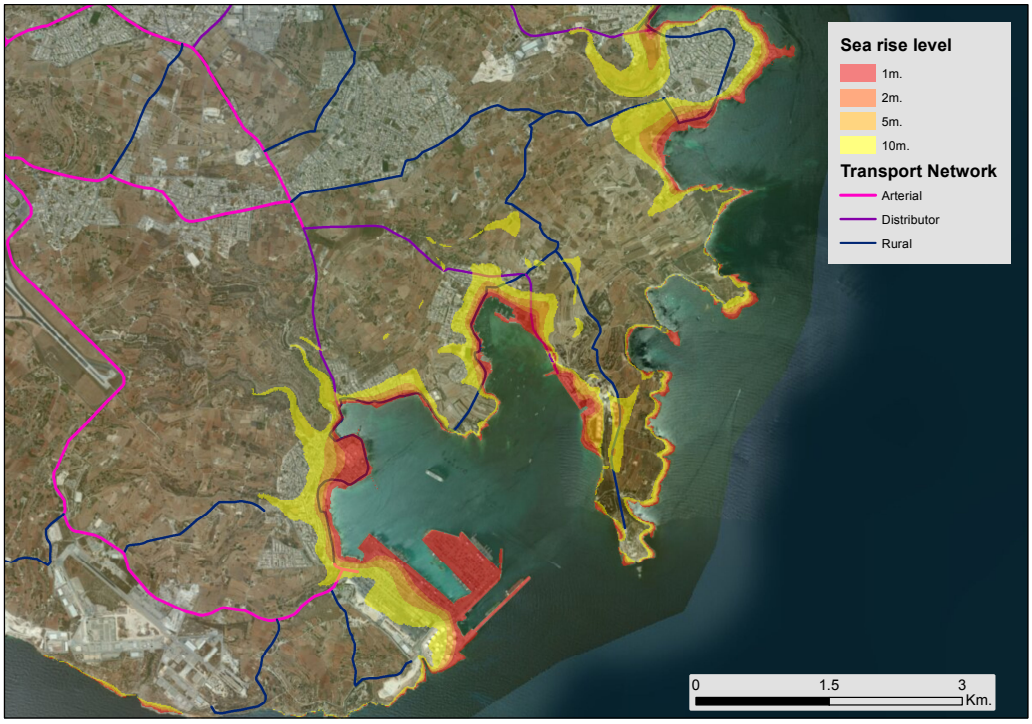
(b)

(c)

Figure 3: The location of intermittent rivers and streams and the roads affected by flash flooding on the main road network in Malta (a) and Gozo (b). A detail of the Grand Harbour area showing the extent of roads affected (c).



(a)



(b)

Figure 4: Extent of sea level rise in the ports of Valletta (a) and Marsaxlokk (b).

mental aspects but also concerns over global environmental change which might affect the long term feasibility of such a project, particularly when such large infrastructures are designed and built to last very long (over 25 years).

For the purposes of this paper, five aspects will be discussed with respect to the impact of global environmental change. This section seeks to inform the reader about the potential impact and describe the major concerns.

(i) *Employment*

In the period April–June 2014, 29.8 per cent of employed persons were engaged in activities related to wholesale and retail trade, transport and storage, accommodation and food service activities. Another 5.3 per cent were employed in other services. These rely heavily on the transport infrastructure, with many of these services being directly related to tourism.

Ramboll (2010) reports that Malta's tourism sector represents 27 per cent of national GDP and employs over 10,000 full-time workers. Tourism is still quite seasonal with 37 per cent arriving during summer, 44 per cent arriving during the shoulder seasons and 19 per cent arriving in winter. The effects of global environmental change on employment, particularly in hotels, are substantial when one considers that most of the hotels are found in coastal locations and prone to sea-level rise (Table 3).

Tourism, however, might also be affected by changes in weather patterns highlighted in the previous sections. Increased precipitation, extreme weather events and increased temperatures, particularly in summer and the shoulder months, might deter tourists from coming to Malta. The potential change in climate might affect the current seasonality of tourism: levelling out the summer peak would be welcome, but the potential impact of increased precipitation and flash flooding would make the winter months not particularly pleasant to visitors.

An impact on tourism would also have a direct impact on the land transport sector, particularly the car rental companies, coach and minibus services and taxi services. The vehicle fleet at the end of 2013 showed a 2 per cent share by these types of vehicles supporting tourism and other sectors.

The impact of sea level rise and flooding is also significant to the port infrastructure. In 2012, 1.45 million tourists visited the islands and three per cent of these arrived by sea (Malta Tourism Authority, 2013). These are dependent on safe berthing for cruise liners as well as adequate

Table 3: Number of hotels in Maltese coastal localities, by star rating (2014). In bold localities at risk of sea level rise.

Locality	5⋆ Hotels	4⋆ Hotels	3⋆ Hotels	2⋆ Hotels	Guest house	Hostels	Total
SAN PAWL IL-BAHAR	**0**	**15**	**14**	**4**	**4**	**0**	**37**
SAN ĠILJAN	**6**	**7**	**10**	**2**	**4**	**0**	**29**
SLIEMA	**2**	**6**	**11**	**3**	**4**	**0**	**26**
MELLIEHA	**1**	**8**	**2**	**0**	**1**	**0**	**12**
VALLETTA	1	0	2	2	3	0	8
GŻIRA	**0**	**3**	**3**	**0**	**0**	**0**	**6**
MUNXAR	**0**	**1**	**2**	**2**	**1**	**0**	**6**
ŻEBBUĠ (Gozo)	**0**	**1**	**0**	**0**	**3**	**0**	**4**
MSIDA	**0**	**0**	**0**	**2**	**1**	**0**	**3**
MARSASCALA	0	0	0	1	2	0	3
GHAJNSIELEM	0	2	0	0	0	0	2
XAGHRA	**0**	**1**	**0**	**0**	**1**	**0**	**2**
SANNAT	1	0	0	0	0	0	1
FLORIANA	1	0	0	0	0	0	1
MARSAXLOKK	**0**	**0**	**1**	**0**	**0**	**0**	**1**
BIRGU	0	0	0	0	1	0	1
BIRŻEBBUĠIA	0	0	0	0	1	0	1
HAMRUN	0	0	0	0	1	0	1
PIETA	**0**	**0**	**0**	**0**	**0**	**1**	**1**
PEMBROKE	0	0	0	0	0	1	1

ground transport infrastructure for day tourism. This entire infrastructure can be easily disrupted by extreme weather events, precipitation in the short term and sea level rise in the long term.

(ii) *Product or Service Growth/Decline*

The uncertainty over the potential impacts of climate change makes any prediction of product or service growth/decline quite challenging.

Malta's economy is not very diverse, and its resilience to world-wide financial instability is mainly due to its islandness, macroeconomic stability and efficient market mechanisms (Blake, Sinclair & Sugiyarto, 2003). The growth of particular sectors including pharmaceuticals and e-gaming, are heavily dependent on a reliable transport connection to the island, as well as around the islands. Some figures can help put these sectors into context:

- The cruise liner sector registered a growth from 476,422 passengers in 2010 to 562,812 passengers in 2012 (Malta Tourism Authority, 2013).
- The pharmaceutical industry employed over 1,000 people and exported products worth over €200 million (KPMG, 2011).
- The tonnage of cargo un/loaded in Malta in 2013 amounted to 6.7 million and 2.9 million respectively for both ports (National Statistics Office, 2014).
- In 2012, 97 per cent of tourists arrived in Malta by air, making Malta International Airport a critical infrastructure.

(iii) *Capital Investment*

Section 4 of this paper has shown some of the transport infrastructure that will be prone to the impacts of sea level rise and flooding. Even though these are the more obvious impacts, other impacts due to extreme weather events, winds and storms might also affect the airport and port infrastructure.

The impact of global environmental change can be reflected in the amount of capital investment required to maintain the infrastructure which is heavily affected by extreme weather in both summer and winter, as well as the construction of new infrastructure to replace that which is lost to sea level rise or regularly flooded. The type of investment would be similar in extent and cost to the €56 million flood water relief project undertaken currently by government, which hopes to reduce the impact and disruption of extreme weather events and flash flooding on Malta's main road network (Ministry for Transport and Infrastructure, 2015).

(iv) *Competitiveness*

Competitiveness reflects an economy's ability to attract and retain companies with stable or growing activity levels, while maintaining or raising the quality of life of those who participate in the economy (Storper, 1993). Malta's competitiveness is based on a number of factors. Its strategic location and membership of the European Union, its relatively stable political environment, attractive labour and investment legislation, a skilled and disciplined workforce, and an economy which has registered a relatively stable growth over the past decade (International Monetary Fund, 2009), all contribute to the islands' competitiveness.

Transport is not generally seen as a main critical factor for a country's competitiveness. Other aspects of the economy are generally more important, such as the availability of factors of production, level of demand, related and complementary industries, together with strategies, structures and the competencies of companies. Despite this, transport has a critical role in providing a favourable business environment (Thomas & Molina, 2004).

In the case of Malta, competitiveness can be affected by a poor performance of the connectivity and accessibility to and within the island. The potential impact of extreme weather events, sea level rise and heavy rainfall disrupting infrastructures and access is very high, given Malta's already saturated road network and limited mobility options (JRC (Joint Research Centre), 2012).

(v) *Skills/Educational Development and Upgrade*

The shortage of skills within the islands' transport sector was recognised by Attard (2005) (p.30) where it was stated that "successful planning and implementation of sustainable transport policy would require primarily a number of professionals in the field of land transport planning. Another problem hindering the adoption and implementation of transport policies in Malta is the limited human resources". This recognition

is still a concern today with the skills capacity in the field of road transport being relatively low. This ranges from roads and materials engineering, transport modellers and control engineers specialised in telematics and intelligent transport systems, integrated IT systems for transport network management, transport planning, economists and behavioural specialists for road transport. A full array of transport managers for air and sea transport operations, and the respective expertise from civil engineers specialising in relatively large transport infrastructures, is urgently required. Moreover, there are still areas of skills mismatch in the fields of transport and logistics, freight movements and passenger services.

Despite transport being high on the agenda with respect to concerns over traffic and congestion (Anon, 2014, October 20) and in particular its contribution to climate change (Malta Resources Authority, 2014), very little investment has been made into the development of requisite transport-related skills. The University of Malta does not yet provide specialised courses in transport engineering, planning and management, and policy. Recent efforts at encouraging research in the field of transport within the Institute for Climate Change and Sustainable Development, at the University of Malta, are reaping benefits and are increasing the awareness for more capacity (Attard, 2014, January 28).

5 Conclusion

This paper has attempted to address the impact of global environmental change on transport in Malta, with special attention paid to the economic implications of changes on (i) employment, (ii) product or service growth/decline, (iii) capital investment, (iv) competitiveness and (v) skills/educational development and upgrade. A number of methods were applied to estimate the impact on the transport infrastructure within the Maltese Islands. An array of data was then used to describe the potential implications of these impacts on the islands.

It is evident that, overall, global environmental change will have a significant impact on Malta's transport infrastructure and sector. It is thus important to ascertain the costs of a 'do nothing' scenario versus actions which, if timely, can have an impact on the sustainability of the transport sector in the islands.

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