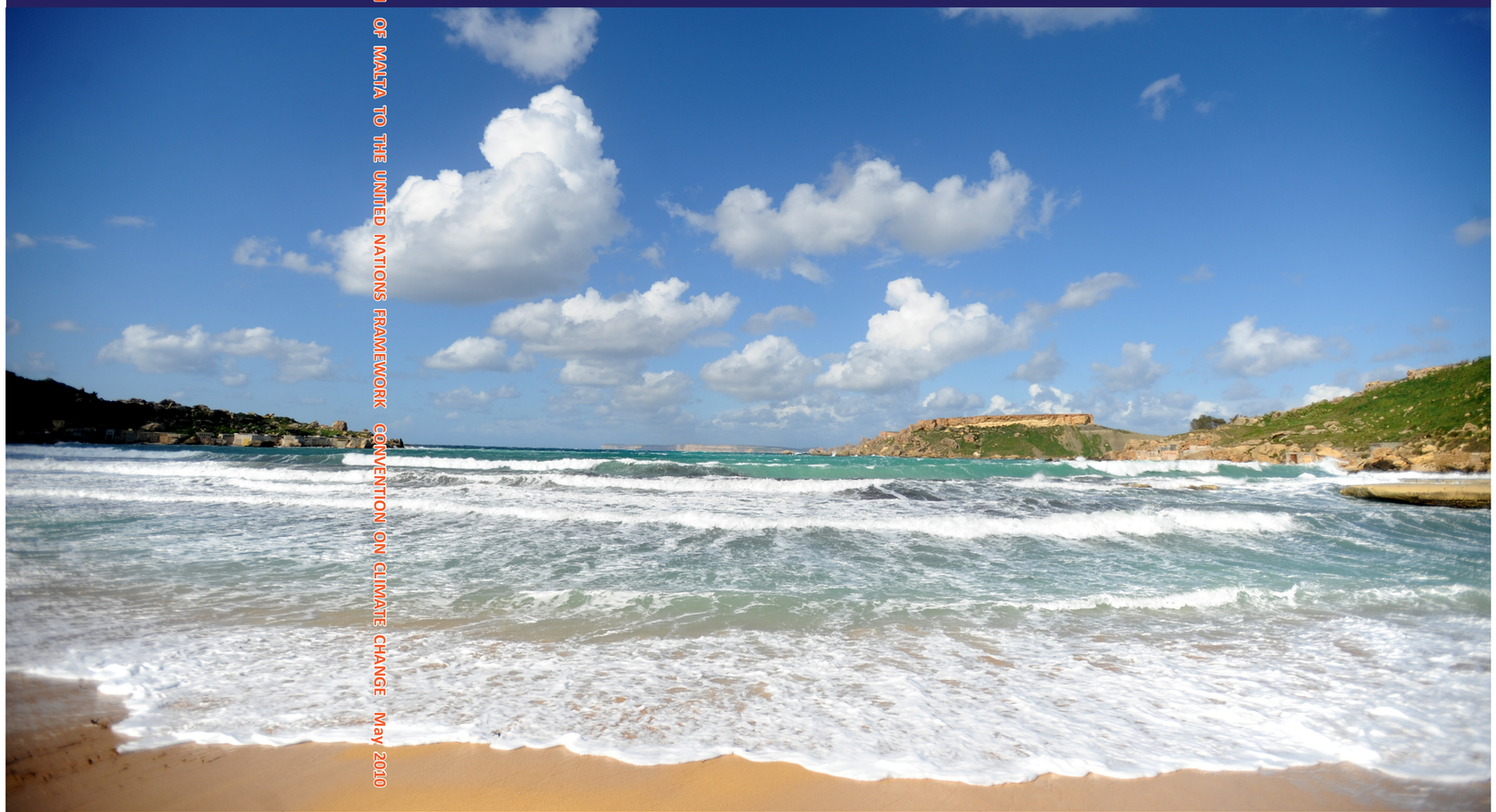
THE SECOND COMMUNICATION OF MALTA TO THE UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE

May 2010



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Ministry for Resources and Rural Affairs
University of Malta

Ministry for Resources and Rural Affairs
www.mrra.gov.mt

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MIGRATION

12.0 Executive Summary

The climate of the Maltese Islands can be best described as being typically Mediterranean, with a mild wet winter invariably followed by a long dry summer. The IPCC FAR [255] clearly states that warming of the climate system is unequivocal as evidenced from observations of increases in global average air and ocean temperatures and average sea level amongst other parameters. The last twelve years (1995-2006) have ranked among the twelve warmest years in the instrumental record of global surface temperature (since 1850) with a one-hundred year linear trend (1906-2005) of 0.74 [0.56 to 0.92] °C which is larger than the corresponding trend of 0.6 [0.4 to 0.8] °C (1901-2000) given in the Third Assessment Report (TAR) [256]. This evidence clearly manifests that temperature will be one of the key factors which will change the human landscape and which could lead to certain areas becoming too hot to support sustainable lifestyles.

The issue of climate migrants needs to be seen from three main aspects namely:

- internal migration;
- external migration as part of the Maltese population seeks new temperate climates;
- external migration as a result of an influx of foreign immigrants seeking more sustainable living patterns.

Malta's role in the experience of asylum seekers is emerging as ever more significant by the year. Although currently due to political circumstances, it is clear that Malta is a likely destination for migrants seeking refuge, mainly due to its geographical situation. Hence its vulnerability to migratory effects resulting from climate change cannot be ignored and a focus is needed on the assessment of the country's potential carrying capacity as a result of potential climatic outcomes. Vulnerability is defined as the effects of shocks emanating out of climate change on human welfare. The 2006 UNHCR Statistical Yearbook clearly states that Malta is now hosting the second largest number of refugees compared to its national size, a clear indication of Malta's vulnerability to other forms of migration.

A proper adaptation strategy is one which takes climate change considerations into account, to the extent feasible, in social, economic and environmental policies, practices and actions by all stakeholders. Adaptation will be required to reduce the costs and disruptions, alter behavioural patterns and give an additional context to decision making to acknowledge those causes derived from climate change, particularly from extreme weather events. In particular the outlook for Malta's carrying capacity needs to be studied in terms of the ability of the land to support:

- existing development : which may be at risk due to increased flooding of low lying areas due to sea level rise;
- abstraction of current fresh water resources : which as a result of modified rainfall patterns may give rise to lower volumes of good quality water;
- crop yields : which may be adversely effected from higher temperatures and hence evapotranspiration rates;
- livestock yield : where growth may be compromised under modified conditions.

Adaptation to the potential effects of climate change on water resources is proposed to be addressed through improved governance, building capacity to handle the prevailing issues, increased research and development efforts, strengthening education and communications and looking at ways to prevent certain impacts by adapting our behaviours.

12.1 Introduction

The 2006 UNHCR Statistical Yearbook clearly states that with 4,500 refugees per 1000 square kilometres, Malta is now hosting the second largest number of refugees compared to its national size, followed by The Netherlands (3,600 per 1,000 km^2), the latter having ranked second in 2006. As at the end of year Malta had 2,404 refugees with 211 asylum seekers having pending cases. This brings the total population of concern up to 2,615 [214].

With the exception of Malta, in the first two quarters of 2007 compared to the last two quarters of 2006, all countries of Southern Europe (Cyprus, Greece, Portugal and Spain) experienced a significant increase in asylum applications [214]. During 2006, the origin of asylum applications was forthcoming, in the main, from the following countries:

Eritrea	393
Somalia	208
Sudan	181
Ethiopia	123

It is also worth reiterating that whilst Malta ranked second (2^{nd}) in the number of refugees 2002-2006 per square kilometre, it ranked fortieth (40^{th}) and one-hundred and thirteenth (113^{th}) in terms of the number of refugees 2002-2006 per 100 inhabitants and to GDP (PPP) per capita respectively.

It is also worth concluding this analysis by providing supplementary statistics that characterize irregular immigrants in Malta. These figures are based on the News Release 135/2006 [200].

Irregular immigrants arrive on Maltese shores by boat and as such arrive in significant group. Table 12.2 hereunder summarises the number of boats arriving in Malta between 2002 and mid-2006 and the number of people on board.

Year	Number of boats arriving	Number of people on board	Average number of people on board per boat
2002	21	1,686	80
2003	12	502	42
2004	52	1,388	27
2005	48	1,822	38
Up to mid-2006	9	378	42

Table 12.1: Possible Impacts of Climate Change on Migration [200].

Refugees in Malta are not a new phenomenon - in fact statistics from 1995 clearly show that the possibility of reaching Malta cannot be discounted. This means that although current refugees tend to be of a political orientation, future refugees of a climatic orientation remain possible. Table 12.2 shows the number of refugees arriving in Malta.

Year	Number of Refugees	…of whom Children
1995	698	200
1996	538	162
1997	448	140
1998	450	125
1999	378	64
2000	277	48
2001	244	55

Table 12.2: Recognised Refugees in Malta [200].

Inadequate preparation for climate change scenarios could result in a decrease in the human carrying capacity of the most affected regions. This is due to associated declines in water resources which in turn will give rise to lower abilities to sustain food and animal production. Similarly, rises in temperatures and an increase in extreme events are associated with making certain regions inhabitable as would the phenomenon of sea water level rises. When one considers the setting in those areas which already have a dry climate of a subtropical nature, often overpopulated and economically poor, there is a potential of around 400 million people being effected [278]. Africa has been identified as one of the areas at risk with a potential 184 million people in danger of death before the end of the 21st century as a result of climate change through floods, famine, drought and the resulting conflict [215].

Additionally, hundreds of millions could suffer hunger, water shortages and coastal flooding [381].

Examples of possible impacts of climate change on migration due to changes in extreme weather and climate events, based on projections to the mid- to late 21st century are summarized hereunder. These do not take into account any changes or developments in adaptive capacity.

The issue of climate migrants needs to be seen from three main aspects namely:

- internal migration as a result of the potential restricted accessibility of low lying coastal areas as a result of any potential sea level rise or intermittent flooding due to increased heavy spells of rainfall restricting the business as usual utility of these areas with the consequent search for areas for alternative accommodation which are not prone to such scenarios;
- external migration as part of the Maltese population seeks more temperate climate north of Malta, and who have, as a result of climate change phenomena acquired climatic conditions similar to those Malta enjoyed previously;
- external migration as a result of an influx of foreign immigrants fleeing their home country in search for more sustainable living patterns.

12.2 Climate Change Scenarios

Climate change can be a driver to alter the quality of life. As temperatures rise, fresh water quantities could be under increased pressure and taken in combination with any sea water level rises, the carrying capacity of the land may be reduced. Carrying capacity refers to the ability of the land to support:

- the existing development: which may be restricted through the potential permanent flooding of low lying areas due to any potential sea level rise or intermittent flooding due to increased heavy spells of rainfall;
- the extraction of current water resources: decreased quantities of rainfall, more intense rainfall patterns and any rise in sea level rises contributing to the increased salinization of the freshwater lens give rise to lower volumes of good quality groundwater and contribute towards a potential decrease the overall quality of the same water;
- the yield of crops: which may be adversely effected from higher temperatures and reduced water supplies
- the yield of animals: who's growth may be compromised under adverse conditions.

The climate of the Maltese Islands can be best described as being typically Mediterranean, with a mild wet winter invariably followed by a long dry summer. The IPCC FAR [380] clearly states that warming of the climate system is unequivocal as evidenced from observations of increases in global average air and ocean

temperatures and average sea level amongst other parameters. The last twelve years (1995-2006) have ranked among the twelve warmest years in the instrumental record of global surface temperature (since 1850) with a one-hundred year linear trend (1906-2005) of 0.74 [0.56 to 0.92] °C which is larger than the corresponding trend of 0.6 [0.4 to 0.8] °C (1901-2000) given in the TAR [380]. This evidence clearly manifests that temperature will be one of the key factors which will change the human landscape and which could lead to certain areas becoming too hot to support sustainable lifestyles.

Global average sea level has risen since 1961 at an average rate of 1.8 [1.3 to 2.3] mm/yr and since 1993 at 3.1 [2.4 to 3.8] mm/yr, with contributions from thermal expansion, melting glaciers and ice caps, and the polar ice sheets. Whether the faster rate for 1993 to 2003 reflects decadal variation or an increase in the longer-term trend is unclear. Notwithstanding, sea level rise can, through consequential flooding of existing land areas and salinization of water resources force communities to abandon their territory in search for more sustainable grounds.

The FAR observes that between 1900 to 2005 precipitation quantities declined in the Mediterranean with the global area affected by drought likely to have increased since the 1970s. Precipitation is crucial towards the sustainability of freshwater resources be they surface or groundwaters. Declines in precipitation quantities can cause severe water resource pressures that could pose a threat to health and human life as well as to the carrying capacity of food production. This would in itself be a stimulus for the mass exodus of populations from such areas in search for better pastures.

12.2.1 The Local Dimension

Malta's role in the experience of asylum seekers is emerging as ever more significant by the year. The cause of this migration is of a political nature but still it is very clear that Malta is a likely destination for migrants fleeing from Northern Africa in particular. This is mainly due to its geographical situation, which means that every year a number of irregular immigrants reach Maltese shores. In 2005, 48 boats brought a total of 1,822 irregular immigrants to Malta. When compared to figures for the previous year, this translates into an increase of 434 irregular immigrants. Statistics available up till the 14th June 2006 show that the total number of boats reaching Malta was nine, which corresponds to 378 irregular immigrants [280].

The previous section has examined the potential impact that might result on the Maltese Islands as a result of climate change impacts on foreign territories. This section deals with the impact that climate change may have on internal and external migration as a result of climate change impacts on the Maltese Islands.

Before entering into further discussions, it must be pointed out that migration in the Maltese contexts is far different from migration in an international context. With the island of Malta being 27 km long, and 14.5 km wide, displacements are only relative

when compared to international displacements. Notwithstanding, for a group of islands 316 km^2 in area, land restrictions represent a potential problem.

Low lying areas, below the 1 m contour, are those most at risk and which merit closer monitoring, should a rise in sea water levels occur. Moreover, areas close to the 1 m contour, in the eventuality of an actual rise in sea water level, are also likely to be at risk of serving their current use as they will become the subject of increased flooding. Similarly, low lying areas below the one metre contour, and which are inland (eg. valleys) may also experience losses. It must be emphasized that such projections are based on regional scenarios and that local projections are still unclear as to the specific effects that might result specifically in the case of Malta. It has already been pointed out that for the purposes of this report, although there has been no sea level rise in Malta since the last 15 years, a precautionary approach has been adopted by choosing to use global sea level rise rates or the more recent rates observed in Malta. Hence the need for long time-series recordings of sea levels in order to establish trends which might give rise to more accurate forecasting of the projected sea level rise associated with climate change. Monitoring would also be required to any areas that are developed in the proximity of clay slopes, in the case that increased rainfall intensities coupled by increased drying and wetting could lead to slippages which could affect the sanity of such developments.

Should any such losses materialize, these could have the potential to force an inward, internally based, shift in demographics as people move away from these newly flooded areas to seek better shelter. These losses could also mean a loss of certain agricultural properties as well as businesses. It could also mean a more increased flooding return period for development located in valleys.

The dense nature of our urbanized areas will undoubtedly call for a re-adjustment of demographics and an assessment of the suitability of the current infrastructure to service such demographic changes needs to be analysed.

It is also interesting to note that recent research from the Deutsche Bank [79] places Malta as a country which risks suffering considerably due to climate change. The physical and economic characteristics are strongly linked giving strength to the hypothesis being put forward in this report and, by comparison, also strengthening predictions for the superlative heating that would be expected in certain areas which could lead to climate migration to more temperate areas.

Reverse trends cannot be neglected either. It is a possibility, albeit potentially remote, that the rise in local temperatures would cause a shift whereby previous temperate climates that characterized areas of the Mediterranean including Malta might migrate northwards towards countries that are currently not experiencing such temperatures. This might induce a movement outwards from Malta (in a scenario where temperature rises would characterise it as a hot, arid climate) to the newly temperate climates. This would cause a potential drain of resources similar to the ‘brain drain’ that is being experienced in certain sectors. Careful monitoring of such conditions would need to be kept in view.

12.3 Vulnerability and Adaptation

Climate change can be a driver to alter the well being of a community. Through climate change phenomena, the well being of a community may be altered by changes in:

- the intensity and frequency of extreme rainfall events (floods and droughts);
- the amount of water available and the demand exerted thereon;
- water quality; and
- temperature

Changes in these variables have a potential impact on the tolerance a community can have to prevailing climatic conditions as well as to the carrying capacity of the land.

Vulnerability is defined as the effects of shocks emanating out of climate change on human welfare. This section will attempt to establish the degree and causes of identified vulnerabilities with a view to proposing adaptation strategies to assess such. The problems that are envisaged to cause water shortages as a result of changes related to climate are identified hereunder.

Malta's Water Resources Review (FAO, 2006) makes some interesting observations. It warns that whilst there is no compelling statistical evidence of climate change affecting the water resources of the Maltese Islands, there is a risk that climate change will become a serious issue in the future. This comprehensive Review states that in a scenario where the sea level of the Mediterranean Sea is expected to rise by up to 96 cm by 2100 a consequential rise in the freshwater lens will occur which will have a negative effect on the abstraction stations in the sea-level aquifers. It is to be noted that for the purposes of this report, although there has been no sea level rise in Malta since the last 15 years, a precautionary approach has been adopted by choosing to use global sea level rise rates or the more recent rates observed in Malta.

Using MAGICC/SCENGEN version 5.3 it was possible to come up with projections extending over the next one-hundred years for important climate parameters. Without delving too deeply into the uncertainty associated with the results (which are described in Chapter 5) it is interesting to note the following results which are summarised in Table 5.8. It can be pointed out very briefly that while models for temperature increase are quite robust, those for precipitation and sea level rise are associated with high degrees of uncertainties.

12.3.1 Adaptation Strategy

A proper adaptation strategy is one which takes climate change considerations into account, to the extent feasible, in social, economic and environmental policies, practices and actions by all stakeholders. Adaptation will be required to reduce the costs and disruptions, alter behavioural patterns and give an additional context to

decision making to acknowledge those causes derived from climate change, particularly from extreme weather events like storms, floods and heat waves. In respect of climate migration, an adaptation strategy must give due consideration to factors such as the potential carrying capacity of the land to support a re-dimensioned population.

Phenomenon and direction of trend	Likelihood of future trends based on projections for 21st century	Impact
Increased frequency of hot days and nights.	Virtually certain	Living conditions deteriorate as a lack of water resources, health and hygiene and tolerance to temperature.
Warm spells/heat waves. Frequency increases over most land areas.	Very likely	Living conditions deteriorate as a lack of water resources, health and hygiene and tolerance to temperature. Pressure on natural water resources accentuate and permeate such conditions.
Heavy precipitation events. Frequency increases over most areas with overall declining annual precipitation quantities.	Very likely	Adverse effects on quality of surface and groundwater; contamination of water supply; water scarcity may be relieved. Disease may be more pronounced and health and hygiene may be compromised.
Area affected by drought increases	Likely	Carrying capacity of food production decreases leading to famine or an increased cost in food imports.
Increased incidence of extreme high sea level	Likely	Decreased freshwater availability due to saltwater intrusion and flooding of low lying areas

Table 12.3: Possible impacts of climate change on migration. Adapted from [255].

Carrying capacity refers in general to the potential of the land to sustain the economic, social and environmental pressures that may result (e.g. the ability to provide sufficient food, water, shelter and employment and to financially support such).

12.3.1.1 Governance (Legislation, Policy, Regulation and Institutions)

Good governance for climate change needs to be factored as an integral part of policy making. It is important to ensure that the country is sensitised to the challenges that are being faced by ongoing changes in climatic conditions and to safeguard the population against such phenomena as far as possible. Adaptation measures include:

Modelling and Data

Data regarding climatic parameters are collected by different entities. Often enough, the lack of the availability of such data, in its raw format, does not encourage research in this field. The setting up of a Climate Change Observatory would be able to collate all data inputs and make them available for researchers. This Observatory could form part of a wider Mediterranean based Observatory in order to foster research amongst the Mediterranean partners as well as to ensure that climate and desertification modelling may be carried out on a sizeable catchment.

The NSO is Malta's central competent authority responsible for statistics. Notwithstanding there are other entities who collect data. Within the business and citizen environment, data sharing concepts are promoted as part of Malta's better regulation agenda. The creation of an inventory of data collecting sources and the consolidation of such data in a manner that can be accessed from a single platform is called for. This would facilitate research as well as provide useful information for those wishing to embark upon climate and water related projects and research.

Metrics should be created to understand further Malta's vulnerability to the impacts of climate change including climatic impact on existing agricultural, water and mineral resources; technical capability; social cohesion and adaptability.

Land Use Policy

Directive 2007/60/EC on the assessment and management of flood risks obliges Member States to undertake preliminary flood risk assessments as well as to subsequently prepare flood hazard maps and flood risk maps.

Any rise in sea water level, whether it results in the forecast modelled by MAGICC/SCENGEN or even if it is worse as suggested by other sources, could have a potential knock on effect on low lying areas. With a preamble of ensuring that there is sufficient evidence that indicates the certainty of loss of land as a result of such phenomena, land use planning should take into account the potential effects of climate change in that zones at risk are identified immediately with a view to preventing or highlighting the risk of their development as well as to undertake an educational campaign for those areas which are already developed. The competent authority for planning should constantly monitor sea levels with a view to be in a position to monitor the development of any flooding scenarios.

The revised version of the Structure Plan for the Maltese Islands could easily factor such considerations.

Insurance

Taking the provisions outlined in respect of land use into account, any rise in sea water level could have a potential knock on effect on low lying areas. With a preamble of ensuring that there is sufficient evidence that indicates the certainty of loss of land as a result of such phenomena, it is important that, in collaboration with the financial services sector, the issue of insurance implications of properties/activities in flood prone areas should be explored with a view to determining whether there is cause for differentiating between various zones whilst at the same time offering protection to those who may still wish to operate in vulnerable areas.

Identify No-Regrets Strategies

No-Regrets strategies are ones taken in response to the threat of climate change which argues that energy-saving measures should be undertaken immediately to help reduce global warming and climate change. Even if the threat of climate change is not as pronounced as we now fear, there should not be any regrets because society would have benefited from saving the energy. In this context one should take into account the projects and initiatives which Government is taking in this respect.

Other no regret strategies could include proper water management to lower the overall demand as much as possible with a view towards sanitising further groundwater resources. Similarly, the abandonment of cultivation of water intensive crops should be considered and replaced by more water tolerant species that would however maintain food supplies as close to current levels as possible.

12.3.1.2 Capacity Building

Strengthening Public Capacity

A response team should be identified, possibly reporting to the Civil Protection Authorities, in order to assess, address and prepare for climate change scenarios which could include the need to respond to increased migration pressures; increased risk of disease; food and water shortages; and potentially conflict - contingency planning for a range of potential scenarios.

The public administration should also have a contingency plan with a view to determine in such eventualities the migrants' entitlements in terms of the country's immigration policies but also taking into account the socio-economic fabric.

Malta should also place this problem at the forefront of the international community's agenda with a view to ensure that it is supported by the international community in these endeavours.

Risk Assessment

A risk assessment should be conducted in order to determine the population growth that the current infrastructure can support - electricity, water, sanitation, economic and social services. Moreover the potential risk of integration needs to be properly evaluated on the experience of the current responses to political migrants. The current legal framework needs to be tested against potential immigration scenarios.

12.3.1.3 Research and Monitoring

Encourage Research Initiatives

Research into the variation of various parameters in response to climate change needs to be encouraged. For this purpose, it is vital that Government, through its research institutions, gives priority to such actions. The University should try and attract various students to undertake their dissertations in this area whilst EU funding instruments should, where possible, place climate change initiatives at the forefront of national priorities.

This is also in line with Malta's R&I Strategy which places great emphasis on popularising and incentivising Science and Technology disciplines.

Undertake Research for Adaptation

Adaptation is not an option - hence establishing ways and means of adapting to phenomena beyond our control as quickly as possible is imperative. Undertaking research for adaptation across the whole spectrum of life is important as the impact of new migrants will effect the whole framework upon which Maltese governance.

Monitoring

The setting up of a Climate Change Observatory which would have access to all data that is required and that is currently collected through national resources has already been referred to. This observatory could also focus upon a wider geographical spread that could delineate threats of extensive climate migration.

12.3.1.4 Education and Communications

National Minimum Curriculum

The current revision of Malta's National Minimum Curriculum should seek to combine the emergence of environmental issues in a more holistic manner taking into account the need to learn about the management of our environment in a sustainable manner throughout all the stages of compulsory education. This becomes more evident once the need to generate a new culture within upcoming generations becomes a must with focus on the social, economic and environmental

impacts of climate change being presented in a tangible and understandable manner.

Educate and Communicate

Education should not be limited to compulsory education or to the formal education system. The potential of coastal area flooding should be communicated effectively both to existing owners of immovable property as well as to potential developers. Care must be taken to understand the impact of climate change over the wider Mediterranean basin and the possibility of intercontinental migration becoming the result of both political and climate reasons.

Within the communications dimension, Government has a role to play. Through its horizontal role in society it can send key messages to all actors in favour of behaviours which are in synch with climate change good practice. This needs to be done creatively and in a manner that it uses the right message to reach out to the various audiences that characterise society.

Changes in Behaviour

The sensitisation of people towards better behaviour in their use of resources in a more sustainable manner would be profitable. The attitudes would increase the resilience of such resources from the effects of climate change. The dependence on government efforts is not enough and the message that every single person can contribute towards minimising the effects of climate change needs to be spread.

12.3.1.5 Acceptance of Certain Impacts

Coastal Areas

There is still an amount of uncertainty on the outcome of sea water rise vis-à-vis how this will impact, if at all, Malta. Notwithstanding, it is important to understand the potential scenarios that might result. In this respect Malta may need to identify scenarios that identify those coastal areas which are likely to be subject to increased flooding as a result of various climate change outcomes. This would give an indication of the extent of areas which might need to be earmarked for redevelopment which befits the revised use of such areas.

Malta's eventual implementation of the Floods Directive will also serve to integrate this aspect into policy making.

Changes in Crop Cultivation Patterns

Even the agricultural community will need to adapt with current practices having to be altered to take into account the potential scenario of higher salinity levels, lower fresh water volumes and the loss of agricultural land to flooded areas. Such

developments and scenarios need to be studied ahead of any onset of such phenomena.

Any changes in volumetric or intensity characteristics of rainfall will undoubtedly have a knock on effect on the water available for irrigation. Whatever the outlook and whatever changes may occur, the situation today is already at critical levels with a considerable amount of groundwater being abstracted directly for agricultural purposes. If the current situation is afflicted by the changes in precipitation, temperature and sea water level rise, the demand versus availability balance is sure to become even tighter as more crop water requirements become necessary but with lower amounts of groundwater and stormwater available to satisfy such increases in demand.