Ministry for Resources
and Rural Affairs
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NATIONAL CLIMATE CHANGE ADAPTATION STRATEGY

May 2012

National Climate Change Adaptation Strategy

Ministry for Resources and Rural Affairs

Government of Malta

May 2012

Executive Summary

The Ministry for Resources and Rural Affairs presents this National Strategy for Climate Change and Adaptation following the review of the work submitted to it by the Climate Change Committee appointed in August 2009 and a review of the feedback received following the national consultation process the Ministry held between November 2010 and June 2011.

The recommendations that the Ministry presents in this Report, which are to a large extent an endorsement of the recommendations presented to it by the appointed Committee, are to be reviewed within the context of two other important works.

The first is the National Strategy for Policy and Abatement Measures relating to the Reduction of Greenhouse Gas Emissions. It is pertinent to reiterate that this work presented recommendations with regards to the strategic and organisational framework required to develop, coordinate, implement and review policy relating to climate change mitigation *as well as* adaptation.

This Report reiterates the importance of having in place the capacity necessary for an integrated framework with regards to the design and development of mitigation and adaptation climate change policy.

Additionally, this report recommends that given the Government has articulated a strategy with regards to mitigation and climate change and that through this report it is establishing a strategy with regards to adaptation and climate change, there is now a strong case for the introduction of a legislative framework that strengthens through legislation the powers and functions of the competent authority to successfully meet the objectives of the strategic way forward.

The second important work is the Second Communication on Climate Change presented by Malta to the United Nations Framework Convention on Climate Change (UNFCC). The work carried out by the Climate Change Committee on Adaptation complements the comprehensive work carried out by the University of Malta and other stakeholders in this regard. Indeed, to ensure synergy and joined-up policy, the Chair of the team responsible for the Second Communication was also appointed on the Climate Change Committee on Adaption – and in doing so bridging both bodies.

The effects and policy counter measures that may be adopted as a consequence of climate change and adaptation are still very much in their infancy - not just in Malta but in most international jurisdictions. Malta, particularly, is constrained by two limitations.

First, the modelling technology available today is still such that the level of resolution renders it next to impossible to model climate change and adaptation scenarios on a geographical terrain as small as Malta. Thus, within such a limitation, the extent to which modelling may be applied with regards to the behaviour of climate change and adaptation is that of obtaining a general understanding of projected behaviour in the Mediterranean region and more specifically in the Southern Mediterranean region; and thereafter seek to super-impose such results onto modeling scenarios related to Malta.

The second is that whilst the University of Malta has built a very strong climate change discipline within the Faculty of Science that is significantly active with regards to research and modelling on climate change adaptation and mitigation, research on important sectoral policy domains (say transport, aviation, law, economics, insurance, vulnerabilities, etc) and climate change generally as well as specifically has yet to reach a degree of critical mass.

The Committee, given limitations in projections and reseach, presents recommendations that address Malta's sustainability - that is policy matters and issues that require attention today irrespective of how climate change behaviour may affect Malta in the future. The emphasis is on giving priority to 'no regret' options: options that would deliver tangible environment and sustainable development results independently of climate change considerations given that such measures are still required to secure sustainable development in Malta.

Additionally, the proposed way forward demands that adaptation policy actions complement measures already taken or planned to be taken in the area of mitigation. Many measures, such as those aimed at improving the energy efficiency of households and enterprise, or at reducing the need to produce fresh water through energy intensive processes, have a crucial role to play in both mitigation and adaptation efforts.

Following the consultation process and a review of the Committee's report the Government affirms the following Actions:

01. The Education and Communications Unit within the Climate Change Division of the Malta Resources Authority is to be set up.

02. By June 2013 the Malta Resources Authority will design and carry out a comprehensive survey instrument directed to gauge the level of understanding of climate change adaption in Malta.

03. Policy recommendations relating to climate change adaptation are very often not scientific or technical solutions but behavioural solutions and thus the implementation of a sustained education and communications campaign that is both long term and targets simultaneously different sectors of the public is core to the function of the Malta Resources Authority.

04. The Malta Resources Authority shall establish communications partnerships with stakeholders such as employee representatives, employer representatives, local councils, the Local Council Association (and Mayors who signed up to the Covenant), environment pressure groups, et al, wherein such partners could act as intermediaries on communication themes assigned to them.

05. The Malta Resources Authority shall adopt a comprehensive communication and education strategy based on the multiple use of different channels, is underpinned by a strong visual and animation component and which interlinks within the Interactive Science Centre being built by the Malta Council for Science and Technology.

06. The Malta Resources Authority will enter into discussions with the Directorate of Education Services – particularly given the consultation process underway on the National Curriculum Framework – 2011, to assess how the curriculum of the personal and social development subject, taught at both primary and secondary level, can be

calibrated to allow for the teaching of climate change related information; identify how teaching of the subject can be achieved indirectly through other subjects, identify and design teaching aids.

07. The capacity and resources of the Climate Change Division of the Malta Resources Authority is to be strengthened by full-time staff as follows: (a) Strategy, Policy and Economics – 2 full-timers; (b) Programme Management – 2 full-timers; (c) Education and Communications – 1 full-timer. Malta Transport Authority, Enemalta Corporation and the Water Services Corporation are to appoint staff as appropriate from internal resources to the position of Climate Change Policy Analysts.

08. Adaptation measures when designed will not, unless there is no alternative, run counter to mitigation policy measures.

09. The appropriate legislative instrument is designed to establish the Malta Resources Authority as *the* competent regulatory authority for climate change. The legislative framework will endow the Malta Resources Authority with the following functions:

(i) power to regulate and secure compliance when enterprises and public authorities fail to comply, or when they do not provide data and information in this respect.

(ii) coordinate and oversee mainstreaming of both mitigation and adaptation issues in existing policies.

(iv) monitor and oversee implementation of both mitigation and adaptation policies which should continue to be the responsibility of line entities.

(v) adopt national positions relating to climate change adaptation (and mitigation) to ensure an integrated approach.

(vi) provide systematic observation of the effects of climate change on a national level and the development of data archives related thereto.

(vii) assess the best options available when taking national adaptation (and mitigation) measures.

(viii) provide a steady flow of information to civil society relating to adaptation (and mitigation) measures that may be adopted and how they are being implemented.

(ix) acts as the Adviser to Government so as to better guarantee that *all* appropriate options are considered when choosing which adaptation (and mitigation) measures Malta should adopt to meet its obligations under the UNFCCC and the Kyoto Protocol.

(x) secure the broadest extent possible of awareness, public participation and information on matters relating to adaptation (and mitigation) measures.

(xi) sustained and regular adequate qualitative and quantitative public

benchmarking and reporting.

(xii) ensure compliance and secure implementation both at the regulatory and the operational level.

(xiii) secure pro-active adaptation measures to climate change with the goal of preventing environmental emergencies.

(xiv) identify criteria for assessment when selecting key technologies that facilitate sectoral adaptation to climate change; address gaps related to the transfer of and access to environment technologies; and establish obligations for research and systematic observation systems relevant to the various sectors.

(xv) ensuring that Government entities with a leading role in climate change and adaptation integrate climate change data onto a multi-layered Geographical Information System owned by the Authority.

10. The Malta Resources Authority will work with the Malta Council for Science and Technology to:

(i) assess the introduction of an instrument based on the EU LIFE programme directed to boost local research in promoting technological response strategies and tools for adaptation measures as well as in investing in the capacity building of human capital climate change adaptation disciplines.

(ii) ensure that the new National Strategy for Research and Innovation targets research related to the impact of climate change on Malta and related solutions to specific policy issues.

11. The Malta Resources Authority will establish a long term institutional relationship with the University of Malta (and other higher education institutions) so that students undergoing under-graduate, post-graduate and doctoral research are encouraged to conduct such research in how climate change affects different policy domains such as insurance, economics, legislation, tourism, agriculture and health

12. The mainstreaming of climate change adaptation measures will be addressed as soon as possible in the revision of the structure plan and the local plans.

13. Changes in, amongst others, temperature, precipitation, and drought in Malta over the past 50 years make it prudent to assume the measures for climate change adaptation that are planned and embarked upon today should far outweigh the costs of inaction from both an economic and social perspective. Priority will be directed towards adaptation policy and implementation measures that Malta still requires to undertake to secure sustainability of its environment irrespective of whether projected climate change behaviour does materialise.

14. Sustainable development continues to be one of the core national issues. The debate on this generation's use of natural resources and the natural resources that this generation will pass on to future generations is central to the climate change debate,

policy design and development, and subsequent implementation. Every effort will be invested to achieve national consensus and a bipartisan agreement.

15. Malta cannot continue to rely exclusively on active cooling to counter the effects of poor building design. Designs should be improved, if necessary by force of law and economic dis/incentives, to maximise passive cooling supported by the education of households / industry on cost effective retro-fitted of energy and water technologies onto existing buildings.

16. Malta should consider supporting an EU Soil Directive that is risk-based, proportionate, and sufficiently flexible to address national and local circumstance.

17. A core pillar of the adaptation strategy is the continued conservation of biodiversity and ecologically dependent ecosystems and, wherever possible, the restoration of habitats to a favourable conservation status.

18. Malta will continue to work on a reform of the EU Common Agricultural Policy (CAP), so as to shift resources from production towards activities providing environmental benefits.

19. Threats to natural areas and the countryside will be addressed through a number of measures such as:

- fiscal (dis)incentives that would aim to encourage people to move towards the urban areas rather than away from them.

- a strict 'no tolerance' ODZ policy, in particular for any new residential development or any increase in scale of existing residential development in these areas.

- improving the quality of design, and life, in urban areas, both by providing quality green (and not just) open areas as well as providing quality amenities and facilities required by young families and the elderly in particular.

20. Malta will adopt a national strategy and appropriate contingency plans to deal with the threat posed by alien and invasive species, which could also have significant health and economic implications and beef up its border customs, veterinary, and phytosanitary controls with third countries.

21. MRA has embarked on a programme to install meters on boreholes. Following a one year monitoring process, policy direction will be set. The Government will continue to work to ensure that the process of over-extraction through the misuse and abuse of boreholes is reduced at the earliest possible given that the loss of this natural resource could have implications on economic, environmental and social activities in Malta. Following the conclusion of studies underway with regards to extracted water from boreholes, the Government will determine the appropriate quotas and sanctions to be applied with regards to specific crop plans. Government should also introduce in a phased manner a polluter’s fine compliance regime targeting those who abuse or misuse water resources which allows and persuades people to adjust and change behaviour and norms as a climate change adaptation culture is inculcated.

22. Government will continue to implement the Legal Notice issued earlier this year that severely limits the use of domestic boreholes whose primary use is for recreational purposes, such as swimming pools, lawns and private gardens. Malta cannot afford the extravagant use of a public resource for private gain.

23. The provision of treated sewage effluent as a cheaper source of water for use by the agriculture community will continue to be studied by the Government given that such a source can act as an economic substitute to the use of ground water.

24. The Government will continue to work with stakeholders and will mobilise resources as necessary to meet the EU Environmental Liability Directive and the EU Water Framework Directive obligations prior to the 2027 target date, to the extent that this is scientifically and technologically possible.

25. Given the strategic importance of water, both in terms of its scarceness and the need to secure the regeneration of the water tables, studies will be undertaken to determine appropriate mechanisms, based on social, economic and environmental considerations, directed to reduced the level of private extraction of from the current 17.5 million m^3/year to 16 million m^3/year – with such a framework to be introduced in a gradual manner over a short time frame, but not later than end of 2013, detemined following consultations with appropriate stakeholders, and following a minimum of 12 months monitoring programme.

26. The Government will continue to implement incentives schemes directed at the farming and livestock breeding sector to construct or rehabilitate existing reservoirs to capture rainwater for irrigation and other appropriate uses.

27. The Government will continue to introduce appropriate economic instruments directed at the farming and livestock breeding sector to encourage them to use water more efficiently as well as to use the best-available irrigation technologies.

28. The Government will introduce incentive schemes directed at commercial and industrial entities to assist them to build reservoirs and other rainwater catchment measures; to re-use captured water; and to recycle grey water for non-potable purposes as well as to introduce efficient water use technologies.

29. The Government will introduce incentive schemes directed towards domestic households that have a cistern and water catchment infrastructure but require the appropriate plumbing to direct captured water for re-use as well as for the repair of cisterns in households.

30. The Ministry of Gozo jointly with the Malta Resources Authority is piloting a project directed at providing the free supply of water saving kits technologies such as water low-use taps that could reduce the use of water by the household sector.

31. The Government will assess the recommendation of the Committee that a Flood Fine is introduced for those properties that, following the 2007 notice on cisterns as a planning requirement by the Malta Environment and Planning Authority, do not have cisterns. Due to the complexity involved to enforce this recommendation, the Ministry

will also asses how to implement this recommendation. The revenue collected from this fine will go to a Flood Management Fund, which will act as a source of financing for collective flooding relief remedies such as the maintenance and upkeep of flood mitigation infrastructure such as roadside reservoirs, soak ways, and dams.

32. The Government shall take appropriate measures to severely restrict the use of groundwater for landscaping and introduce a tough financial penalty regime to discourage misuse of a scarce and valuable resource. The Government will continue to do its utmost to ensure that its own landscaping and afforestation projects do not use groundwater unless it is not cost effective to do otherwise.

33. The Government shall carry out the appropriate cost benefit assessement (which will assess amongst other matters demand and feasibility of use given the potential contamination by chemicals) with regards to the implementation of a project for the re-use of captured water and the use of grey water to:

- replace groundwater demand by 2 million m^3/year by 2020;
- replace groundwater demand by 3 million m^3/year from 2021 to 2030.

The promulgation of such policy measures should be supported by a sustained education and awareness campaign vis-à-vis the usage of rainwater in relation to health issues. Prior to the identification of infrastructural requirements to transport treated sewage effluent, it is important that the potential of treated sewage usage is determined.

34. The Government will continue with further studies (which will assess amongst other matters demand and feasibility of use given the potential contamination by chemicals) such as those underway in Gozo to determine infrastructural requirements such as the use of a bowser vehicle network for the distribution of treated sewage treatment effluent on a regional and national scale.

35. The Government will carry out a cost benefit assessment to determine the optimal re-use of the San Antnin network. One of the options will be the Committee's recommendation with regards to the application and extension of the San Antnin network and its link to Ta' Barkat given that the South East Area has a high potential for the re-use of treated sewage effluent.

36. The Water Services Corporation will continue with its work to evaluate the appropriate incentives to encourage the agricultural, industrial, commercial, and domestic sectors to use sewage treatment effluent within pre-defined guidelines as opposed to using groundwater. This should be coupled with the introduction of disincentives on the use of groundwater. In considering the implementation of this recommendation, policymakers are to take recognisance that issues related to the quality of treated effluent exist and that the regulatory frameworks and safeguards are in place prior to actual implementation.

37. The Government will carry out the appropriate studies to assess whether through the introduction of facilities for the distribution and supply of quality treated effluent, the government should seek to achieve the following targets:

- provide 5 million m^3/year by 2015 as a replacement of groundwater used for agriculture, commercial, and industrial need;
- provide 10 million m^3/year from 2016 to 2020 as a replacement of groundwater used for agriculture, commercial, and industrial need;
- provide 15 million m^3/year from 2021 to 2030 as a replacement of groundwater used for agriculture, commercial and industrial need.

In considering the implementation of this recommendation, policymakers are to take recognisance that issues related to the quality of treated effluent exist and that the regulatory frameworks and safeguards are in place prior to actual implementation.

38. The Ministry for Resources and Rural Affairs will continue to secure, as a minimum, the current level of activity directed to maintain and preserve valleys in Malta and Gozo, given that such action not only controls flooding but will acts as a natural reservoir allowing the captured water to sink into the aquifer.

39. The Ministry for Resources and Rural Affairs will continue to work with the Malta Environment and Planning Authority to implement regulatory framework relating to the maintenance and preservation of valleys.

40. The Ministry for Resources and Rural Affairs shall continue to take all the appropriate action to secure the implementation of the National Flood Relief Plan by the projected 2015 target date.

41. The Ministry for Resources and Rural Affairs has investigated the feasibility of adapting flood relief infrastructure for this to be also suitable for rain water harvesting but technical, environmental and cost-benefit and feasibility studies for the National Flood Relief Project demonstrated that this is not economically viable on a large scale. The Ministry shall continue to carry out studies between 2014-2021 and 2022-2029 to assess the technical, environmental and financial viability of a wide range of alternatives for enlarging existing rain harvesting infrastructure, as well as for enhancing the potential of reuse through the existing infrastructure. On the basis of these project appraisals, it will select the most suited options to develop and enhance infrastructural that adds value, and it will seek to secure EU Structural funding to assist the country to continually adapt to the adverse impacts of climate change on the availability of fresh water resources, by implementing rain harvesting and reuse projects, with the most appropriate type, scale and location, during these periods.

42. The Ministry for Resources and Rural Affairs shall carry out a thorough review of the status of existing storm water reservoirs, soak ways, and dams.

43. The design or refurbishment of roads or road landscaping will continue to integrate reservoirs to act as water catchment areas to cushion flooding, as well as allow for the seepage of such water into the aquifer. The government should seek to progressively increase the number of existing soak ways along the road infrastructure in such a way as to divide the catchment area into manageable smaller catchment areas which allow for recharge of the aquifer.

44. The Water Services Corporation will continue to channel applied R&D&I in order to seek improvements in rendering Reverse Osmosis water treatment management more efficient, particularly through the combination of renewable energy sources with RO operations.

45. The Water Services Corporation, will continue to identify and reduce leaks in the water distribution system as a direct measure to conserve water to the maximum level possible.

46. The Ministry for Resources and Rural Affairs shall bring together all the appropriate stakeholders so that a contingency plan for drought periods is prepared.

47. Work will continue on the construction of a 3-D numerical model to further understand the aquifer systems in Malta as soon as possible.

48. Work will continue with the studies underway to determine whether the artificial recharge of aquifers in Malta is technically and financially feasible.

49. The Department of Agriculture will embark on a comprehensive study leading to the design of a National Agricultural Policy by June 2013

50. The Department of Agriculture will undertake the appropriate study and action to maintain Maltese agro-ecosystems through the management of agricultural landscapes given the central role they play in contributing to overall resilience to climate change.

51. The Department of Agriculture will strive to secure synergy between mitigation and adaptation strategies so as to vitalise agricultural activity since this can contribute to climate change mitigation by reducing its emissions, through the production of renewable energies and bio-products, and by storing and accumulating carbon in soils.

52. The Department of Agriculture will strengthen information and advisory support on climate-related matters to farmers and agricultural workers which is considered as essential for nurturing motivation and preparedness to adapt.

53. The Malta Resources Authority and the Department of Agriculture shall establish strong institutional links with the Institute of Earth Systems at the University of Malta to spur appropriate research on how climate change affects Maltese agriculture and how agriculture can suitably adapt to and mitigate these effects.

54. The Malta Resources Authority and the Department of Agriculture shall establish strong institutional links with the Institute of Earth Systems of the University of Malta to design and introduce specific indicators for Maltese agriculture, such as an index for adaptive capacity and vulnerability.

55. The Department of Agriculture will work with appropriate stakeholders to study and recommend how local breeds and crop varieties together with new species and hybrids could play an important role in agricultural adaptation.

56. The Department of Agriculture will continue to spur through appropriate financing the modification of facilities used for the production of livestock to reduce heat stress on animals while using the best understanding of the chronic and acute stresses that livestock will encounter to determine the optimal modification strategy.

57. The Department of Agriculture will continue to work with the rural community to encourage them to adopt sound land management practices which are essential for soil conservation and which, together with flexibility regarding land use, will help minimise the impacts of climate change on agricultural soils as well as to encourage them to embark on long-term management strategies that increase soil organic matter, resulting in a soil which has a high nutrient content and strong water-holding capacity, which renders the land better able to cope with future climatic changes.

58. The Elderly Department will endeavor to have all health-care facilities and homes for older persons equipped with air-conditioning facilities and/or cool rooms as appropriate, so to be prepared against the eventuality of more frequent and more prolonged heat waves.

59. The Elderly Department will work to ensure that homes for older persons and healthcare facilities safeguard the health of residents from projected higher summer temperatures and more frequent heat waves; and if necessary establish legally binding standards such as, for example, compulsory monitoring of indoor ambient air temperature.

60. The Ministry for Health will assess and identify measures required to strengthen the continuous and rigorous surveillance of infectious diseases and their vectors; for the undertaking of a proper risk assessment, for the identification of measures to reduce the possibility of outbreaks of climate change related vector-borne diseases, and to ensure that, in the event that an outbreak does occur, a plan is in place to control the outbreak as early as possible.

61. The Ministry for Health will assess and determine the local entomological expertise required for the relevant identification and mapping of distribution of vectors that carry disease and to take appropriate measures to address arising gaps.

62. The Ministry for Health will continue to maintain and where appropriate strengthen programmes directed to reduce the potential risk on food safety, given that the projected climatic scenario for the Maltese islands is likely to have an adverse effect on food safety with the subsequent risk of food-borne illness.

63. The Government will ensure that early warning systems in place, in particular for heat waves / high temperatures and flooding events, are developed and strengthened.

64. The Government shall take upon the recommendation of the Committee that education campaigns on adaptation to climate change should focus on health issues. Local research indicates that the public is more willing to change their lifestyle and to be supportive of climate change policy if it is presented in this manner.

65. The Parliamentary Secretariat for Tourism, the Malta Tourism Authority, the Malta Hotels and Retailers Association, and other stakeholders shall complete by June 2013, a detailed and comprehensive analysis of international and local data with regards to the impact of climate change on the Southern Mediterranean in general, and on Malta specifically, and subsequently to identify the macro as well as micro impacts on the tourism industry in Malta. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.

66. The Parliamentary Secretariat for Tourism, the Malta Tourism Authority, the Malta Hotels and Retailers Association, and shall complete by June 2013, a detailed and comprehensive analysis of how water scarcity will affect the tourism industry in general, and micro segments of the tourism industry specifically, such as for example, agro- and eco-tourism; the impact this will have on the competitiveness of the tourism industry; and the adaptation measures required to counter climate change effects and retain Malta as an attractive and competitive destination. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.

67. The Parliamentary Secretariat for Tourism, the Malta Tourism Authority, the Malta Hotels and Retailers Association, and other stakeholders shall complete by June 2013, a detailed and comprehensive analysis of theimpact of winter and summer energy and power demand of hotels and other tourist establishments as a result of anticipated climate changes, the impact this will have on the competitiveness of the tourism industry, and the adaptation measures required to counter climate change effects and retain Malta as an attractive and competitive destination. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.

68. The Parliamentary Secretariat for Tourism, the Malta Tourism Authority, the Malta Hotels and Retailers Association, and other stakeholders shall complete by June 2013, a detailed and comprehensive analysis of the impact of the anticipated climate changes on energy, water, and road infrastructure; on the historical heritage; on the landscape; and on the rural environment. The study should seek to assess the actual physical cost of repair arising from damages to the infrastructure; the actual and opportunity cost this may have on the tourism services sector; and present specific adaptation measures in this regard. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.

69. The Malta Tourism Authority will seek to establish strong institutional links with the University of Malta as well as other stakeholders to undertake a series of focused studies targeting different aspects of the tourism industry and the related potential climate change impact.

70. The Malta Tourism Authority, building on the work of the aforementioned studies, shall draw up a Tourism Action and Contingency Plan by December 2014 that incorporates both mitigation and adaptation measures specific to the tourism sector. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.

71. The Government will assess the recommendation of the Committee that revenues generated from the auctioning of allowances, including revenue generated from the aviation sector, under the Emissions Trading Scheme are channelled towards the financing of a Climate Change Adaptation National Emergency Fund.

72. The Malta Resources Authority will steward discussion amongst stakeholders to identify suitable mechanisms and instruments that will ensure that the insurance market remains sustainable in the event of increasing unpredictability of climate change impacts on various sectors in Malta.

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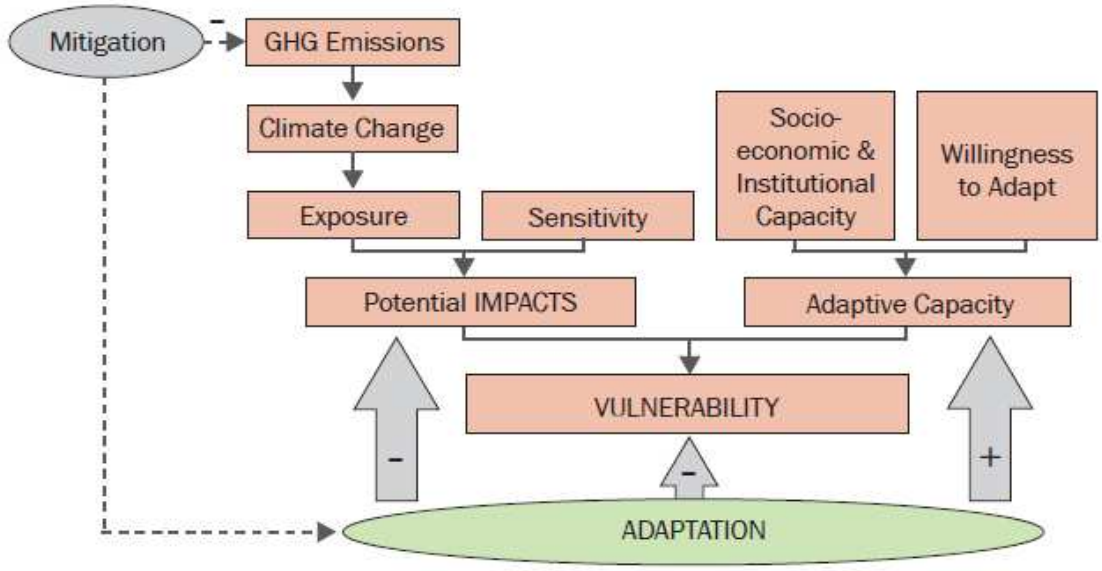
01. Introduction

01.1 The National Climate Change Adaptation Strategy

The Climate Change Committee for Adaptation (CCCA) presented its report to the Minister for Resources and Rural (MRRA) affairs in November 2010[1]. In designing its report the Committee adopted an approach that sought to interrelate between climate change impacts, vulnerabilities and adaptation needs. In essence, the Committee sought to replicate, within the modelling, data, and research limitations, the conceptual approach shown in Figure 01.

Figure 01: Conceptual Approach for the Design of the Report on Adaptation



Source: Isoard, Grothmann and Zebisch (2008)

In adopting such an approach the Committee:

(a) complemented the work carried out by the Climate Change Committee on the National Strategy for Policy and Abatement Measures relating to the Reduction of Greenhouse Gas Emissions[2];

(b) complemented the work carried out by the University of Malta in conjunction with other stakeholders with regards to Malta's Second Communication[3] to the United Nations Framework Convention for Climate Change (UNFCCC)[4]; and

[1] Climate Change Committee, National Climate Change Adaptation Strategy – Consultation Document, 2010,hereinafter referred to as Draft Adaptation Strategy, can be retrieved from http://mrra.gov.mt/page.aspx?id=124

[2] Government of Malta, National Strategy for Policy and Abatement Measures relating to the Reduction of Greenhouse Gas Emissions, 2009, hereinafter referred to as National Mitigation Strategy, can be retrieved from http://mrra.gov.mt/page.aspx?id=124

[3] The launch of the work of the Committee on adaptation coincided with the work carried out by the University of Malta and other stakeholders on the Second Communication to the UNFCCC. Although, as stated in the Committee's report the work carried out by the said Committee supplemented rather than replicated the work on Malta's Second Communication it is clear from a number of articles written in the media, that the two different yet complementary initiatives created some confusion.

[4] Ministry for Resources and Rural Affairs, Second National Communication to the UNFCCC, 2010, can be retrieved from http://mrra.gov.mt/page.aspx?id=124

(c) applied the scientific projections modelled by the Department of Physics at the University of Malta on the basis of which Malta based its Second National Communication to the UNFCCC.

In the carrying out of its work the CCCA consulted with the Malta Resources Authority (MRA); the Malta Environment and Planning Authority (MEPA); and the Parliamentary Secretariat for Tourism, the Environment and Culture.

The Ministry finds it pertinent to underline that to secure synergy as well as joined-up policy in the design of the strategy and policy orientation for climate change and adaptation, it invited onto the the CCCA the respective chairs of the Committee on Mitigation and the Committee responsible for the design of the Second Communication to the UNFCCC.

The Ministry has now assessed the report of the CCCA and assessed any arising changes presented by the Committee folloing the end of the consultation process.

In early Septermber 2011, the Ministry presented its recommendations to Cabinet. Cabinet in establishing the position of Government with regards to climate change and adaptation approved practically all of the recommendations of the CCCA. This document presents the recommendations as proposed by the CCCA and the position of Government.

The Adaptation strategy as presented to the Ministry by the CCCA focuses on the following sectors:

Risks, Financial Impacts and Adaptation

Identifying the Requisite Legal Framework

Sustainability and Adaptation

Water and Adaptation

Agriculture and Adaptation

Human Health and Adaptation

Tourism and Adaptation

Communication, Education and Adaptation

In reaching conclusions with regards to the strategic approach to be adopted with regards to climate change and adaptation measures, Government affirms the Committee's approach that sought a strategic orientation of'no pain' measures – that is, recommendations directed towards action that Malta should take to secure the sustainability of its environment and policy sectors which may be vulnerable to climate change, irrespective of whether projected climate change behaviour *actually* occurs to the extent feared.
It is important that the public and policy makers take due consideration of the fact that the strategy document is an initial step in a compendium of work that complements the work

presented by Malta to the UNFCCC with regards to climate change adaptation and its impact on policy domains in Malta.

Government understands, as recognised by the CCCA itself, that the strategy work carried out by the Committee is not exhaustive. The breadth of policy domains that are potentially vulnerable to climate change adaptation and the degree of complex scientific and empirical studies required to build models of sufficient detail and accuracy render strategy design in this regard on-going.

Adaptation is complex - a multi-disciplinary issue where acknowledgement in international and multilateral instutitons – including the EU - exists of the need to focus on high risks and following further research, identify additional ones and devise adaptation needs accordingly.

Government recognises that the work of the Committee provides an excellent spring board for future local policy review and research. Government recognises that the report prepared by the CCCA should be complemented by further reviews and assessments that provide in-depth research and policy analysis of vertical sectors such as shown hereunder as well the horizontal interplay of such policy domains:

Sector		Impacts
Agriculture	Crop Production	Carrying capacity Accumulated degree days to harvest Yield
Biodiversity	Species of community abundance	Vulnerable Endangered Sustainable population levels
Fresh Water Resources and Coastal Zone		Salinity Flooding Coastal dynamics
Land Degradation	Erosion	Threshold for overland low erosion
Fisheries		Alien species Intrusion Destruction of native species
Migration		Natural hazards Disasters Intensity Type of migrant flows and movement Span of migrant flows and movement Displacement patterns

It is pertinent to underline that one of the few modifications that Cabinet proposed to the recommendations presented to was the importance of establishing long term institutional mechanisms between the Malta Resources Authority, the University of Malta, research institutes, and other stakeholders that will secure a framework that will encourage students under going under-graduate, post-graduate and doctoral research to conduct such research in how climate change effects different policy domains such as insurance, economics, legislation, tourism, agriculture, health, etc.

01.2 The Consultation Process

In November 2010 the Ministry the placed the report by the Committee in public domain for public consultation. The communications strategy adopted by the Ministry was similar to that adopted with regards to the draft strategy for climate change and mitigation (placed in the public domain for consultation on 15th January 2009). The consultation strategy embraced public fora, meetings with constituted bodies and the media, participation in media programmes et al.

It adopted this approach, in view of the fact that the communications campaign with regards to the mitigation strategy was successful: both in terms of the national debate (and controversy) that it generated, as well as, with regards to the formal responses presented to the responsible Committee by both individual persons and Non Governmental Organisations.

The following are reasons why the consultation process did not meet the expectations set:

(i) It has clearly emerged that a debate on climate change adaptation effects, at least within our polity, is constrained by the fact that adaptation risks and vulnerabilities are far more difficult for the public to grasp than greenhouse gases and related mitigation effects. A vehicle belching exhaust is immediate and real. A potential desertification of Malta's agricultural land due to pervasive scarcity of rainfall may be seen as a 'doomsday' scenario and turn off attention.

(ii) The use of conventional mediums to communicate the adaptation report were not sufficiently animated to demonstrate arising effects which are neither immediate nor visible – and in doing so engaging interest, curiosity, and follow-up.

(iii) The presentation of a detailed report, which is drafted in a technically biased language seems to have attracted specialist persons and stakeholders and proved to be less appealing to the general public.

The following lessons emerge:

(a) The national strategy on mitigation proposed the setting up of an Education and Communications Unit within the recommended Climate Change Division. It further recommended a series of policy measures that relate to culture building – ranging from a "sustained and continuous public campaign" (Action 2) to an educational strategy based on the principles of accessibility of information, good practice, et al (Action 6).

It is unfortunate that by the time that the adaptation strategy was launched in November 2010, an Education and Communications Unit within the Climate Change Division was as yet to be set up.

Government recognises that the process of mitigating and adapting to climate change is primarily a behavioural one. The successful engagement of a strategic document is less likely to succeed unless the process of engagement is supported by intensive and sustained behavioural change campaigns through education, knowledge and information.

Change has two underpinning requirements: effective handling of the politics of change and careful attention to the management of change. At the heart of both is communication.

Action 01
Action: Immediate Owner: MRA Type:Communications The Education and Communications Unit within the Climate Change Division of the Malta Resources Authority is to be set up

(b) The communications strategy has to graft within it a strong visual and animation channel as a medium to deliver the message – ranging from children to adults. MRA should carry out appropriate research on the Internet for such tools that it can obtain for little or no cost; or to partner with existing foundations and / or NGOs which already have created and designed such material.

Furthermore, MRA should team up with the Malta Council for Science and Technology (MCST) to:

(i) ensure that the interactive centre that is being built will project climate change as one of the science and technology themes

(ii) position the National Research and Innovation programme administered by MCST for the development of indigenous virtual media and tools that vividly project within a 'Malta' context the issues under debate in a manner that is able to capture a person's imagination.

(c) The Climate Change Division develops and organises a roving exhibition consisting of such media as proposed in (b) above that embarks on an extensive round robin process directed to engage individuals within each local community, school children, etc.

(d) The MRA establishes structured relations with not only Non Governmental Organisations but also with the Local Councils Associations. It is pertinent to underline that Local Councils, with a presence in every town in Malta, provide a strategic entry point for a roots up culture behaviour communications strategy. It is further to be noted that some 30 Local Councils in Malta and Gozo signed the

'Covenant of Mayors: Committed to Urban Sustainable Energy'[5] launched by the European Commission.

Local councils, by having their Mayors sign to the Covenant, are not only obliged to submit a Sustainable Energy Action Plan but to 'mobilise the civil society in [the] geographical areas to take part in developing the Action Plan ... have experience and know-how ... organise Energy Days or City Covenant Days, ... spread the message of the Covenant'.

Thus, with almost one half of the Maltese local councils being signatories to the Covenant there is already in place a strong, and powerful local network that MRA can work with, develop and take forward in order to inculcate a better awareness of climate change.

Further to the above, the MRRA will in the near future set-up a Climate Change Consultative Council. The Council will have the following terms of reference:

Terms of Reference of the Climate Change Consultative Council
Provide direct input to policy design, implementation and review with regards to climate change adaptation and mitigation in Malta.
Draw up and implement structured initiatives on specific aspects, programmes or initiatives with regards to climate change adaptation and mitigation in Malta.
Undertake, alone or in partnership with research institutions or working parties, research initiatives with regards to the affects of climate change and specific policy sectors in Malta.
Set up a virtual network on climate change to establish online interaction as well as a virtual resource library.
Draw up views and presents recommendations to the Ministry responsible for Climate Change on policies, positions, working papers, et al issued by the EU, UNFCCC, and other multi lateral international institutions.
Facilitate the empowerment and extensive participation of stakeholders across all strata within the polity with regards to climate change.
Organise on an on-going basis fora to discuss, communicate, inform and educate Maltese society at large with the regards to climate change matters.

The scope of the Consultative Council is to be as representative as possible. It is designed to bring together stakeholders who influence and are affected by policy decisions relating to climate change. It is proposed that the Council will be chaired by Minister who will be - 6 -supported by a vice-chair appointed by the Minister.

The stakeholders to be invited on the Consultative Council are presented in Annex I. It is proposed that the Council would meet every quarter. It is further proposed that the Council would be governed by a Board which will be constituted as follows:

[5] http://www.lca.org.mt/userfiles/file/Covenant/Texte_Convention_EN.pdf

Executive Board to the Climate Change Consultative Council	
Chair	**Vice Chairperson of the Council**
Representatives	**2 members to selected from amongst the Institutes / Departments of the University of Malta / Higher Education institutions**
	A member to selected from amongst the Constituted Bodies
	2 members to selected from amongst Non Government Organisations
	Representative from Tourism and Sustainable Development Unit and MEPA.

The Board of the Council will be responsible for the day to day activities of the Council and for the implementation of Council decisions. Moreover, the Board may convene on a frequent basis to discuss in further technical detail specific issues which may arise from the Council meetings.

It is also envisaged that the Council and / or Board may appoint a number of *ad-hoc* sub-committees, working groups and task forces to follow specific developments deliberated upon by the Council into greater detail, with a view of reporting back to the Council in due course.

The Chief Officer within the Malta Resources Authority responsible for the Climate Change Division will act as the Executive Secretary to the Council and the Board.

Action	Type	Owner	Cost Impact	Date
Action 02 **By June 2013 the Malta Resources Authority will design and carry out a comprehensive survey instrument directed to gauge the level of understanding of climate change adaption in Malta.**	Communication	**MRA** NSO (as appropriate)	Low financial impact	June 2013
Action 03 **Policy implementation recommendations relating to climate change adaptation are very often not scientific or technical solutions but behavioural solutions and thus the implementation of a sustained education and communications campaign that is both long term and targets simultaneously different sectors of the public is core to the function of the Malta Resources Authority.**	Communications	**MRA** MCST Education Private schools Private entities Etc	Low to medium financial impact	Link launch with Science Fair
Action 04 **The Malta Resources Authority to establish communications partnerships with stakeholders such as employee representatives, employer representatives, local councils, the Local Council Association (and Mayors who signed up to the Covenant), environment pressure groups, et al, wherein such partners could act as intermediaries on communication themes assigned to them.**	Communications	**MRA** Local Councils Association Local Council NGOs, et	Low to medium financial impact	Ongoing 2012 -

Recommendation 05 **The Malta Resources Authority is to adopt a comprehensive communication and education strategy based on the multiple use of different channels, is underpinned by a strong visual and animation component and which interlinks within the Interactive Science Centre being built by the Malta Council for Science and Technology.**	Communications	**MRA** MCST	Low to medium financial impact	Immediate
Recommendation 06 **The Malta Resources Authority will enter into discussions with the Directorate of Education Services – particularly given the consultation process underway on the National Curriculum Framework, to assess how the curriculum of the personal and social development subject, taught at both primary and secondary level, can be calibrated to allow for the teaching of climate change related information; identify how teaching of the subject can be achieved indirectly through other subjects, identify and design teaching aids.**	Communications	MRA Education	Low financial impact	Immediate

02. Policy Design and Development with regrds to Climate Change

The Adaptation strategy makes no reference organisational capacity for climate change and adaptation. This, however, is only because this matter was discussed in the climate change mitigation strategy. The CCCA was of the opinion that there was no need to replicate the discussion in this strategy as it agreed with the recommendations presented in this regard in the Mitigation strategy.

Government underlines that the successful attainment of climate change policy – whether this is mitigation or adaptation oriented - is very much dependent on a strong policy design and development framework for climate change.

The following are the salient institution building blocks that Government put forward in the National Strategy for Policy and Abatement Measures relating to the Reduction of Greenhouse Gas Emissions as endorsed by the House of Representatives in September 2009:

Measure	Reference
Set up a high powered Inter-Ministerial Committee under the stewardship of the Prime Minister will be constituted to ensure joined-up policy design and implementation.	Action 10
Climate Change Policy Analysts to be appointed in designated government entities.	Action 11
A Climate Change Division with the mandate to 'secure, both nationally and internationally, policy design and implementation that will result in adaptation to, and mitigation against, Climate Change' is to be set up within the Malta Resources Authority.	Action 12
The Climate Change Unit of the Malta Environment and Planning Authority will be consolidated within the Climate Change Division that is to be established within the Malta Resources Authority.	Action 13
The Climate Change Division will have a resources capacity of 16 Full Time Employees and will focus on four areas: (a) strategy, policy and economics; (b) programme management; (c) education and economics; and (d) technology and research.	Action 15
The Climate Change Division will assume responsibility for the National Inventory for GHG emissions and will establish the strengthening of the said Inventory as a strategic objective.	Action 17

The Climate Change Division, as per Action 12, is constituted within the MRA. Its resources capacity is assigned to the management of the national inventory – the reporting obligations of which are now extended given Malta's membership to the Annex 1 of the UNFCCC in

2010. The Division has a resource base of 7 full-time employees – a Chief Officer and 6 officers, including a head, responsible for the national inventory.

Furthermore, Action 17 has, as seen from the above paragraph, also been implemented as ownership for the national inventory is now migrated from the Malta Environment and Planning Authority (MEPA) to the MRA.

The Ministry and the MRA are of the considered opinion that the original complement for the Climate Change Division as presented in the National Mitigation Strategy can be scaled down and action is underway to strengthen the Climate Change Division as follows:

Function	Complement
Strategy and Policy	1
Economist	1
Education	1
Programme Management	2
Policy Analysts in Energy, Water, and Land Transport Sectors	3

Action 07

Action: Immediate
Owner: MRA
Type: Capacity Building

The capacity and resources of the Climate Change Division of the Malta Resources Authority is to be strengthened by full-time staff as follows: (a) Strategy, Policy and Economics – 2 full-timers; (b) Programme Management – 2 full-timers; (c) Education and Communications – 1 full-timer. Malta Transport Authority, Enemalta Corporation and the Water Services Corporation are to appoint staff as appropriate from internal resources to the position of Climate Change Policy Analysts.

The following presents the position of Government with regards to the recommendations presented by the CCCA on 'Identifying the Requisite Legal Framework'

The following are the actions approved by Government:

Action	Type	Owner	Cost Impact	Date
Action 08 **Adaptation measures when designed will not, unless there is no alternative, run counter to mitigation policy measures.**	Policy	**MRA**	Unknown	Immediate
Action 09 **The appropriate legislative instrument is designed to establish the Malta Resources Authority as *the* competent regulatory authority for climate change. The legislative framework will endow the Malta Resources Authority with the following functions:** **(i) power to regulate and secure compliance when enterprises and public authorities fail to comply, or when they do not provide data and information in this respect.** **(ii) coordinate and oversee mainstreaming of both mitigation and adaptation issues in existing policies.** **(iii) monitor and overseer implementation of both mitigation and adaptation policies which should continue to be the responsibility of line entities.** **(iv) adopt national positions relating to climate change adaptation (and mitigation) to ensure an integrated approach.** **(v) provide systematic observation of the effects of climate change on a national level and the development of data archives related thereto.** **(vi) assess the best options available when taking national adaptation (and mitigation) measures.** **(vii) provide a steady flow of information to civil society relating to adaptation (and mitigation) measures that may be adopted and**	Legislation	**MRRA** MRA AG's Office	None	June 2013

how they are being implemented. **(viii) acts as the Adviser to Government so as to better guarantee that *all* appropriate options are considered when choosing which adaptation (and mitigation) measures Malta should adopt to meet its obligations under the UNFCCC and the Kyoto Protocol.** **(ix) secure the broadest extent possible of awareness, public participation and information on matters relating to adaptation (and mitigation) measures.** **(x) sustained and regular adequate qualitative and quantitative public benchmarking and reporting.** **(xi) ensure compliance and secure implementation both at the regulatory and the operational level.** **(xii) secure pro-active adaptation measures to climate change with the goal of preventing environmental emergencies.** **(xiii) identify criteria for assessment when selecting key technologies that facilitate sectoral adaptation to climate change; address gaps related to the transfer of and access to environment technologies; and establish obligations for research and systematic observation systems relevant to the various sectors.** **(xiv) ensuring that Government entities with a leading role in climate change and adaptation integrate climate change data onto a multi-layered Geographical Information System owned by the Authority.**				
Action 10 **The Malta Resources Authority will work with the Malta Council for Science and Technology to:** **(i) assess the introduction of an instrument based on the EU LIFE programme directed to boost local research in promoting technological response strategies and tools for adaptation measures**	Strategy R&D&I	MRA MCST	Within designated programmes	Initiate as soon as possible

as well as in investing in the capacity building of human capital climate change adaptation disciplines. **(ii) ensure that the new National Strategy for Research and Innovation targets research related to the impact of climate change on Malta and related solutions to specific policy issues.**				
Action 11 **The Malta Resources Authority will establish a long term institutional relationship with the University of Malta (and other higher education institutions) so that students undergoing under-graduate, post-graduate and doctoral research are encouraged to conduct such research in how climate change effects different policy domains such as insurance, economics, legislation, tourism, agriculture, health, etc.**	Research	MRA UoM Other	None	Immediate
Action 12 **The mainstreaming of climate change adaptation measures will be addressed as soon as possible in the revision of the structure plan and the local plans.**	Policy	Minimum: Energy Transport Water Waste	HR Resources	Immediate

03. Sustainability and Adaptation

Over the past decade, there has been a fundamental shift in local policy debate and focus: the state of the environment has become one of the top policy issues. This should not be surprising – it is a national and personal obligation that every effort is done to protect the environment and ensure that this generation hands over to future generations an environment that is self-sufficient.

Securing such a balance, however, has not necessarily been straight forward. Industrialisation, economic growth, and the pursuit of national wealth, together with the maximisation of resources may at times have been achieved at the cost of sustainable development. Though hardly perceptible at times, yet with sustained momentum, it is with satisfaction that the Government notes that Maltese citizens have woken up to the fact the environment needs to be safeguarded – and that within our 300 km^2 land mass, and far larger sea mass, our natural resources need to be not only protected but nurtured.

Climate change is a consequence of the abuse that past and current generations have meted out on the environment, a consequence, which if taken to the worst possible case scenario, will affect, negatively, today's and future generations. There are, of course, those who negate climate change – though, as a matter of interest, the consultation process, limited as the feedback was, did not receive responses supporting such a view.

The issue is to determine what needs to be done to mitigate and embark upon adaptation measures to minimise the arising impacts of climate change. Malta has led, as well as participated, in international initiatives directed at obtaining global agreements aimed at achieving a world-wide collective effort to guarantee sustainable development – ranging from the Kyoto Protocol to the aggressive leading stance that is being taken by the European Union.

Malta is not cocooned from the fall-out of climate change and from the importance of securing sustainable development. Rather, our characteristics – size, dependence on external natural resources, and impacts arising from the behaviour of neighbouring countries – accentuate the difficulties that Malta faces in managing this important issue.

There is no doubt that the public mood has shifted from one of neglect towards our environment to one that views the environment as one of the most important national issues. There is also no doubt that public policy and direction is increasingly more concerned with environmental issues primarily due to the fact that public opinion has mobilised itself into coherent and sustained pressure groups that maintain tight vigilance in this regard. Indeed, increasingly Malta is experiencing a public administration that seeks to adjust its position in the event that initial policy design may fail to reflect national and / or pressure group views' with regards to environment sustainability.

It is pertinent to underline that the Government affirms the CCCA's orientation in the design of its adaptation strategy to place sustainability as one of the important cornerstones of its strategy. The following are the actions approved by Government:

Action	Type	Owner	Cost Impact	Date
Action 13 **Changes in, amongst others, temperature, precipitation, and drought in Malta over the past 50 years make it prudent to assume the measures for climate change adaptation that are planned and embarked upon today should far outweigh the costs of inaction from both an economic and social perspective. Priority will be directed towards adaptation policy and implementation measures that Malta still requires to undertake to secure sustainability of its environment irrespective of whether projected climate change behaviour does materialise.**	Policy	MRA Energy Transport Water Environment Waste Others as appropriate	Not known	As Appropriate
Action 14 **Sustainable development continues to be one of the core national issues. The debate on this generation's use of natural resources and the natural resources that this generation will pass on to future generations is central to the climate change debate, policy design and development, and subsequent implementation. Every effort will be invested to achieve national consensus and a bipartisan agreement.**	Policy	MRRA MRA MEPA	Not known	On-going
Action 15 **Malta cannot continue to rely exclusively on active cooling to counter the effects of poor building design. Designs should be**	Regulation	MRA	Educate/	Immediate

improved, if necessary by force of law and economic dis/incentives, to maximise passive cooling supported by the education of households / industry on cost effective retro-fitted of energy and water technologies onto existing buildings.			disseminate knowledge: low financial impact Otherwise: Primary impact on consumer Positive impact on CO_2 reduction	
Action 16 **Malta should consider supporting an EU Soil Directive that is risk-based, proportionate, and sufficiently flexible to address national and local circumstance.**	Policy	MRA MEPA MRRA (Dept of Agriculture)	Carry out Cost Benefit and Environment Impact Assessment	Implement within Directive timeframes once introduced
Action 17 **A core pillar of the adaptation strategy is the continued conservation of biodiversity and ecologically dependent ecosystems and, wherever possible, the restoration of habitats to a favourable conservation status.**	Policy	MRA MEPA	Carry out Cost Benefit and Environment Impact Assessment	As appropriate

Action 18 **Malta will continue to work on a reform of the EU Common Agricultural Policy (CAP), so as to shift resources from production towards activities providing environmental benefits.**	Policy	OPM MRRA (Department of Agriculture)	None	Within EU frameworks
Action 19 **Threats to natural areas and the countryside will be addressed through a number of measures, but primarily through that include:** **- fiscal (dis)incentives that would aim to encourage people to move towards the urban areas rather than away from them.** **- a strict 'no tolerance' ODZ policy, in particular for any new residential development or any increase in scale of existing residential development in these areas.** **- improving the quality of design, and life, in urban areas, both by providing quality green (and not just) open areas as well as providing quality amenities and facilities required by young families and the elderly in particular.**	Regulation	Policy Advisory Board (OPM) MRA MEPA	Impact on consumers	As appropriate
Action 20 **Malta will adopt a national strategy and appropriate contingency plans to deal with this threat posed by alien and invasive species, which could also have significant health and economic implications and beef up its border customs, veterinary, and**	Policy	MRA MEPA MRRA (Department of	Not known	Immediate

phytosanitary controls with third countries.	Agriculture Department of Veterinary Services, etc) Public Health		

04. Water and Adaptation

Sustainable water resources are vital to Malta's long-term prosperity. Water is necessary for drinking and it supports everyday life at work, at home, and in the carrying out of leisure activities. Water is essential to agriculture and to the health of the natural environment that supports all human activities. Every sector of the economy depends on secure and sustainable access to water.

Despite the very limited resources of the islands and the importance of water to a healthy future, the prevailing attitude amongst the population in general, and target stakeholders specifically, has not resulted in a culture which perceives water as the valued and precious finite resource that it is.

The developments that Malta has made over the past 30 years as a result of the introduction of Reverses Osmosis (RO) technology have potentially transformed a psyche imprinted by the water scarcity and rationing experienced by every household in Malta in the early eighties, to one that is today wasteful in the use of water.

The perception that access to RO filtered water means that Malta has no water problems is incorrect. The generation of RO is expensive in terms of total cost of ownership – even though incremental technological advancement renders today's generation of RO infrastructure more operationally cost-effective. Be that as it may, RO depends, if not entirely, primarily on electricity for power.

This implies that increased dependence on RO water in substitution of natural water, as this diminishes, will result in increased energy generation to power the RO plants. Apart from the cost of increased fossil fuel supply, or gas in the event Malta migrates to such energy source, required to generate the increased usage of RO plants, there will be a corresponding increase – even if gas is used in lieu of fossil fuel – of Greenhouse Gases.

There are no easy solutions to Malta's water shortage yet the nation requires water security for the future.

The following are the actions approved by Government:

Action	Type	Owner	Cost Impact	Date
Action 21 **Malta Resources Authority has embarked on a programme to install meters on boreholes and thereafter carry out a one year monitoring process on the basis of which policy direction will be set. The Government will continue to work to ensure that the process of over-extraction through the misuse and abuse of boreholes is reduced at the earliest possible given that the loss of this natural resource could have implications on economic, environmental and social activities in Malta.** **Following the conclusion of studies underway with regards to extracted water from boreholes the Government will determine the appropriate quotas and sanctions to be applied with regards to specific crop plans.** **Government should introduce in a phased manner a polluter's fine compliance regime targeting those who abuse or misuse water resources which allows and persuades people to adjust and change behaviour and norms as a climate change adaptation culture is inculcated.**	Regulation	**MRA** MRRA	Impact on consumers	Underway
Action 22 **Government will continue to monitor and implement the appropriate Legal Notice issued earlier this year that severely limits the use of domestic boreholes whose primary use is for recreational purposes, such as swimming pools,**	Regulation	**MRA** MRRA	Impact on consumers	Underway

lawns and private gardens. Malta cannot afford the extravagant use of a public resource for private gain.				
Action 23 **The provision of treated sewage effluent as a cheaper source of water for use by the agriculture community will continue to be studied by the Government given that such a source can act as an economic substitute to the use of ground water.**	Substitute water provision	**MRA** WSC	Carry out cost benefit assessment on distribution of treated affluent water to agricultural community	Underway
Action 24 **The Government will continue to work with stakeholders and will mobilise resources as necessary to meet the EU Environmental Liability Directive and the EU Water Framework Directive obligations prior to the 2027 target date, to the extent that this is scientifically and technologically possible.**	Regulation	**MRA** MRRA WSC	Not known	To what is scientifically and technologically possible prior to 2027
Action 25 **Given the strategic importance of water, both in terms of its scarceness and the need to secure the re-generation of the water tables, studies will be undertaken to determine appropriate mechanisms, based on social, economic and environmental considerations, directed to reduced the level**	Regulation	**MRA** MRRA	Impact on consumer	December 2013

of private extraction from the current 17.5 million m^3/year to 16 million m^3/year – with such a framework to be introduced in a phase manner over a short time frame, but not later than end of 2013, detemined following consultations with appropriate stakeholders and following a minimum of 12 months monitoring programme.				
Action 26 **The Government will continue to implement incentives schemes directed at the farming and livestock breeding sector to construct or rehabilitate existing reservoirs to capture rainwater for re-use for irrigation and other appropriate uses.**	Incentive	MRRA **MRA** MEPA	As per budgetary estimate	Replicate as appropriate
Action 27 **The Government will continue to introduce appropriate economic instruments directed at the farming and livestock breeding sector to encourage them to use water more efficiently as well as to use the best-available irrigation technologies.**	Incentive	**MRA** **MRRA** Paying Agency	As per budgetary estimate	Replicate as appropriate
Action 28 **The Government will introduce incentive schemes directed at commercial and industrial entities to assist them to build reservoirs and other rainwater catchment measures; to re-use captured water; and to recycle grey water for non-potable purposes as well as to introduce efficient water use**	Incentive	**MRA** Paying Agency	As per budgetary estimate	Replicate as appropriate

technologies.				
Action 29 **The Government will introduce incentive schemes directed towards domestic households that have a cistern and water catchment infrastructure but require the appropriate plumbing to direct captured water for re-use as well as for the repair of cisterns in households.**	Incentive	**MRA** MRRA	As per budgetary estimate	Replicate as appropriate
Action 30 **The Ministry of Gozo jointly with the Malta Resources Authority is piloting a project directed at providing the free supply of water saving kits technologies such as water low-use taps that could reduce the use of water by the household sectors.**	Incentive	**MRA** MRRA	Pilot financed under the EU ENPI-MED Programme	Pilot underway and adoption of project on a national basis will be based on an assessment of the outcomes of the pilot.
Action 31 **The Ministry for Resources and Rural Affairs will assess the recommendation of the Committee that a Flood Fine is introduced for those properties that, following the 2007 notice on cisterns as a planning requirement by the Malta Environment and Planning Authority, do not have cisterns. Due to the complexity involved to enforce this recommendation, the Ministry will also assess how to implement this recommendation. The revenue collected from**	Regulation	**MRA** MRRA MEPA	Impact on developer	Will carry out economic, social and environmental impact assessment

this fine will go to a Flood Management Fund that will act as a source of financing for collective flood relief remedies such as the maintenance and upkeep of flood mitigation infrastructure such as roadside reservoirs, soak ways and dams.				
Action 32 **The Ministry for Resources and Rural Affairs shall undertake appropriate measures to severely restrict the use of groundwater for landscaping and introduce a tough financial penalty regime to discourage misuse of a scarce and valuable resource. The Government will continue to do its utmost to ensure that its own landscaping and afforestation projects do not use groundwater unless it is not cost effective to do otherwise.**	Regulation	**MRA** MRRA	Impact on consumer	To be determined
Action 33 **The Ministry for Resources and Rural Affairs will carry out the appropriate cost benefit assessement (which will assess amongst other matters demand and feasibility of use given the potential contamination by chemicals) with regards to the implementation of a project for the re-use of captured water and the use of grey water to:** - **replace groundwater demand by 2 million m^3/year by 2020;** - **replace groundwater demand by 3 million m^3/year from 2021 to 2030.** **The promulgation of such policy measures should be backed**	Policy	**MRA** MRRA WSC	Cost benefit assessment required	2m m3/yr by 2020 3m m3/yr by 2030

by a sustained education and awareness campaign vis-à-vis the usage of rainwater in relation to health issues. Prior to the identification of infrastructural requirements to transport treated sewage effluent it is important that the potential of treated sewage usage (such as its potential demand and the feasibility of its use given its potential contamination by chemicals) is determined.				
Action 34 **The Ministry for Resources and Rural Affairs will continue with further studies (which will assess amongst other matters demand and feasibility of use given the potential contamination by chemicals) such as those underway in Gozo to determine infrastructural requirements such as the use of a bowser vehicle network for the distribution of treated sewage treatment effluent on a regional and national scale. Prior to the identification of infrastructural requirements to transport treated sewage affluent it is important that the potential of treated sewage usage (such as its demand and feasibility of its use given its potential contamination by chemicals) is determined.**	Policy	**MRA** MRRA WSC	Cost benefit assessment required	Pilot underway by WSC in Gozo. Regulatory approach being defined.
Action 35 **The Ministry for Resources and Rural Affairs will carry out a cost benefit assessment to determine the optimal re-use of the San Antnin network. One of the options will be the Committee's recommendation with regards to the application and extension of the San Antnin network and its**	Policy	**MRA** MRRA	Cost benefit assessment required	To be determined

link to Ta' Barkat given that the South East Area has a high potential for the re-use of treated sewage effluent.				
Action 36 **The Water Services Corporation will continue with its work to evaluate the appropriate incentives to encourage the agricultural industrial, commercial, and domestic sectors to use sewage treatment effluent within pre-defined guidelines as opposed to using groundwater. This should be coupled with the introduction of effective disincentives on the use of groundwater.** **In considering the implementation of this recommendation, policymakers are to take recognisance that issues related to the quality of treated effluent exist and that the regulatory frameworks and safeguards are in place prior to actual implementation.**	Regulation	MRA WSC	Impact on users	Being evaluated by WSC
Action 37 **The Ministry for Resources and Rural Affairs will carry out the appropriate studies to assess whether through the introduction of facilities for the distribution and supply of quality treated effluent, the government should seek to achieve the following targets:** - **provide 5 million m^3/year by 2015 as a replacement of groundwater used for agriculture, commercial, and industrial need;**	Policy	**MRA** MRRA WSC	Cost benefit assessment required	5m m3/yr by 2015 10m m3/yr from 2016 to 2020 15m m3/yr from 2021 to 2030

- **provide 10 million m^3/year from 2016 to 2020 as a replacement of groundwater used for agriculture, commercial, and industrial need;** - **provide 15 million m^3/year from 2021 to 2030 as a replacement of groundwater used for agriculture, commercial and industrial need.** **In considering the implementation of this recommendation, policymakers are to take recognisance that issues related to the quality of treated effluent exist and that the regulatory frameworks and safeguards are in place prior to actual implementation.**				
Action 38 **The Ministry for Resources and Rural Affairs will continue to secure, as a minimum, the current level of activity directed to maintain and preserve valleys in Malta and Gozo, given that such action not only controls flooding but will acts as a natural reservoir allowing the captured water to sink into the aquifer.**	Policy	MRRA Works Division MEPA	Potential medium to high financial impact	Immediate
Action 39 **The Ministry for Resources and Rural Affairs will continue to work with the Malta Environment and Planning Authority to implement the regulatory framework relating to the maintenance and preservation of valleys.**	Policy	MRRA Works Division MEPA	No impact	Immediate

Action 40 **The Ministry for Resources and Rural Affairs shall continue to take all the appropriate action to secure the implementation of the National Flood Relief Plan by the projected 2015 target date.**	Implementation	**MRRA** **MRA** Works Division MEPA	As per ERDF financing	Underway
Action 41 **The Ministry for Resources and Rural Affairs has investigated the feasibility of adapting flood relief infrastructure for this to be also suitable for rain water harvesting but technical, environmental and cost-benefit and feasibility studies for the National Flood Relief Project demonstrated that this is not economically viable on a large scale. The Ministry shall continue to carry out studies between 2014-2021 and 2022-2029 to assess the technical, environmental and financial viability of a wide range of alternatives for enlarging existing rain harvesting infrastructure, as well as for enhancing the potential of reuse through the existing infrastructure. On the basis of these project appraisals, it will select the most suited options to develop and enhance infrastructural that adds value, and it will seek to secure EU Structural funding to assist the country to continually adapt to the adverse impacts of climate change on the availability of fresh water resources, by implementing rain harvesting and reuse projects, with the most appropriate type, scale and location, during these periods**	Policy	MRRA **MRA** Works Division	Cost benefit assessment	Underway
Action 42 **The Ministry for Resources and Rural Affairs shall carry out**		MRRA MRA Works Division	Cost benefit assessment	Underway

a thorough review of the status of existing storm water reservoirs, soak ways, and dams be carried out with urgency, together with the appropriate cost-benefit assessments.		MEPA		
Action 43 **The design or refurbishment of roads or road landscaping will continue to integrate reservoirs to act as water catchment areas to cushion flooding, as well as allow for the seepage of such water into the aquifer, and should seek to progressively increase the number of existing soak ways along the road infrastructure in such a way as to divide the catchment area into manageable smaller catchment areas which allow for recharge of the aquifer.**	Policy	**MRA** **MITC** Transport Malta MEPA	Depends on road construction schedule	Underway
Action 44 **The Water Services Corporation will continue to channel applied R&D&I in order to seek improvements in rendering Reverse Osmosis water treatment management more efficient, particularly through the combination of renewable energy sources with RO operations.**	Policy Link with new National R&D&I strategy	**WSC** MCST	Unknown	Underway
Action 45 **The Water Services Corporation, will continue to identify and reduce leaks in the water distribution system as a direct measure to conserve water to the maximum level possible.** **.**	Operations	**MFEI** WSC	Unknown	Underway

Action 46 **The Ministry for Resources and Rural Affairs shall bring together all the appropriate stakeholders so that a contingency plan for drought periods is prepared.**	Planning	**MRA** MRRA Stakeholders	Arising from study	Immediate
Action 47 **Work will continue on the construction of a 3-D numerical model to further understand the aquifer systems in Malta as soon as possible.**	Modelling	**MRA** MRRA MCST PPCD UoM	Funding secured under the EU Interreg Programme	Immediate
Action 48 **Work will continue with the studies underway to determine whether the artificial recharge of aquifers in Malta is technically and financially feasible.**	Planning	**MRA** WSC	Funding secured under the EU Med Programme	Underway

05. Agriculture and Adaptation

Although agriculture is a complex and highly evolved sector, it is directly dependent on climate, since heat, sunlight, and water are the main drivers of crop growth.

While some aspects of climate change, such as longer growing seasons and warmer temperatures may bring benefits to this sector, there will also be a range of adverse impacts, including reduced water availability and more frequent extreme weather.

As discussed in the previous Chapter, anticipated changes in Malta's water levels, which are already under threat irrespective of climate change impacts, will directly affect agricultural production and production methods.

Reductions in crop yield and quality as the result of reduced water availability and precipitation variability will have a negative impact on economic players in the agricultural sector.

Moreover, direct financial loss for stakeholders in the agricultural sector is most likely to be further exacerbated by the need for increased spending as a result of damage caused by extreme weather events.

The potential impacts of climate change on agriculture as shown in the draft Strategy document[6] is supported by other research on climate change risks and opportunities with regards to the Mediterranean zone.

A report commissioned by the European Commission DG AGRI concludes that for the Mediterranean south zone the primary concern of the consequences of climate change adaptation are the "potential reductions in total precipitation" and emphasizes that "strategies need to be considered to conserve as much water as possible over winter to maintain supply during the summer"[7].

Moreover, it adds that the attendant "risk of reduced yields was also assessed as high and strategies need to be developed to adopt cultivars or crops better suited to reduced water availability and heat stress [and that] no significant opportunities were identified in this zone, which is not well placed to benefit from the forecast changes in climate"[8].

Furthermore, crop yields are likely to be reduced by increased summer temperatures and drought risk[9]. There may also be problems arising from the introduction of new pests and diseases. The livestock sector is likely to be adversely affected by reduced yields of forage crops and perhaps also heat stress to the animals. Reduced rainfall and consequent changes

[6] National Adaptation Strategy, supra, Chapter 6

[7] AEA Energy and Environment and Universidad de Politecnica de Madrid, *Adaptation to Climate Change in the Agricultural Sector, Report to the European Commission Directorate-General for Agriculture and Rural Development*, December 2007, 47, hereinafter referred to as European Commission DG- Agriculture 2007 report

[8] Ibid

[9] Guereña A., Ruiz Ramos M., Diaz Hambrona C.H., Conde J.R., Minguez M.I., *Assessment of climate change in agriculture in Spain using climate models. Agronomy Journal 93*, 2001, 237-249

in drainage of soils may lead to increased soil salinity[10] and damage to soil structure leading to desertification[11].

Indeed, the impacts of climate change in the Mediterranean Southern zone are forecast to be so serious that land may be no longer in agricultural use[12].

Table 02: Climate Change Adaptation and Agriculture Risks and Opportunities for the Mediterranean South Zone

Mediterranean South zone	Detail of risk/ opportunity	Magnitude	Likelihood	Priority
	Crop area changes due to decrease in optimal farming conditions	HIGH	HIGH	HIGH
	Crop productivity decrease	LOW	HIGH	MEDIUM
	Increased risk of agricultural pests, diseases, weeds	HIGH	MEDIUM	HIGH
	Crop quality decrease	MEDIUM	HIGH	HIGH
	Increased risk of drought and water scarcity	HIGH	HIGH	HIGH
	Increased irrigation requirements	HIGH	HIGH	HIGH
	Soil erosion, salinisation, desertification	HIGH	HIGH	HIGH
	Deterioration of conditions for livestock production	MEDIUM	MEDIUM	MEDIUM
Risk	Sea level rise	HIGH	HIGH	HIGH
Opportunity	n/a	n/a	n/a	n/a

Source: AEA Energy and Environment and Universidad de Politecnica de Madrid, Adaptation to Climate Change in the Agricultural Sector, Report to the European Commission Directorate-General for Agriculture and Rural Development, 2007

The following are the actions approved by Government:

[10] Van Ittersum, M.K., S.M. Howden, and S. Asseng, *Sensitivity of productivity and deep drainage of wheat cropping systems in a Mediterranean environment to changes in CO2, temperature and precipitation. Agriculture Ecosystems and Environment,* 97, 2003, 255-273

[11] Karas, J., *Desertification — Climate Change and the Mediterranean Region,* 2003

[12] European Commission DG- Agriculture 2007 report, *supra,* 48

Action	Type	Owner	Cost Impact	Date
Action 49 **The Department of Agriculture will embark upon a comprehensive study leading to the design of a National Agricultural Policy with a target completion by June 2013**	Strategy	**Agri Dept**	Low financial impact	June 2013
Action 50 **The Department of Agriculture will undertake the appropriate study and action to maintain Maltese agro-ecosystems through the management of agricultural landscapes given the central role they play in contributing to overall resilience to climate change.**	Policy	**Agri Dept**	Medium financial impact Cost benefit assessment required for each site	To be determined
Action 51 **The Department of Agriculture will strive to secure synergy between mitigation and adaptation strategies so as to vitalise agricultural activity since this can contribute to climate change mitigation by reducing its emissions, through the production of renewable energies and bio-products, and by storing and accumulating carbon in soils.**	Policy	**Agri Dept**	Medium financial impact	To be determined
Action 52 **The Department of Agriculture will strengthen information and advisory support on climate-related matters to farmers and**	Information and support	**Agri Dept**	Low financial impact	Immediate

agricultural workers which is considered as essential for nurturing motivation and preparedness to adapt.				
Action 53 **The Malta Resources Authority and Department of Agriculture will establish strong institutional links with the Institute of Earth Systems of the University of Malta to spur appropriate research on how climate change affects Maltese agriculture and how agriculture can suitably adapt to and mitigate these effects.**	Research	MRA UoM MCST Agri Dept	Low financial impact Link with National R&I strategy and EU financing vehicles	Immediate
Action 54 **The Malta Resources Authority and the Department of Agriculture shall establish strong institutional links with the Institute of Earth Systems of the University of Malta as well as other stakeholders to work closely together to design and introduce specific indicators for Maltese agriculture, such as an index for adaptive capacity and vulnerability.**	Information and support	MRA UoM NSO Agri Dept	Low financial impact	Immediate
Action 55 **The Department of Agriculture will work with appropriate stakeholders to study and recommend how local breeds and crop varieties together with new species and hybrids could play an important role in agricultural adaptation.**	Research	MRA UoM MCST Agri Dept	Low to Medium financial impact	To be determined

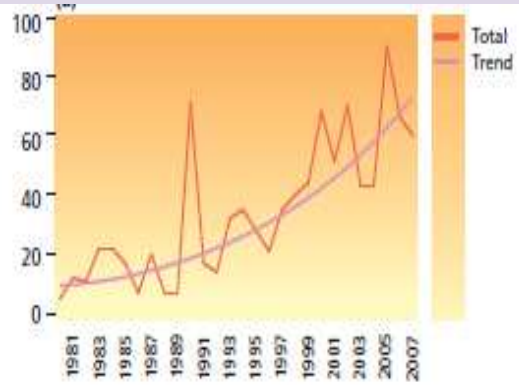
Action 56 **The Department of Agriculture will continue to spur through appropriate financing the modification of facilities used for the production of livestock to reduce heat stress on animals while using the best understanding of the chronic and acute stresses that livestock will encounter to determine the optimal modification strategy.**	Incentive	**Agri Dept**	Medium financial impact	Underway
Action 57 **The Department of Agriculture will continue to work with the rural community to encourage them to adopt sound land management practices which are essential for soil conservation and which, together with flexibility regarding land use, will help minimise the impacts of climate change on agricultural soils. The Department should as well encourage them to embark on long-term management strategies that increase soil organic matter, resulting in a soil which has a high nutrient content and strong water-holding capacity, which renders the land better able to cope with future climatic changes.**	Education	MRA UoM Agri Dept	Low financial impact	Underway

06. Human Health and Adaptation

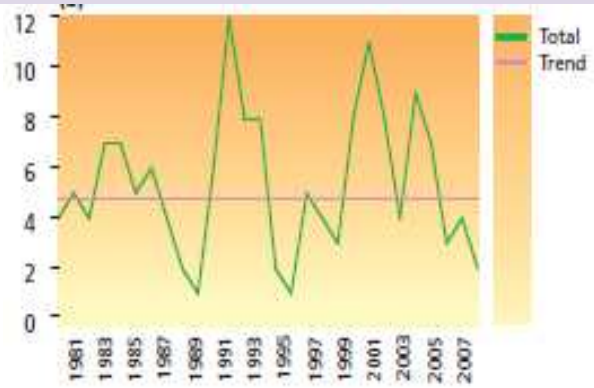
In the European Region, 1097 climate-related events occurred between 1980 and 2007[13]. In contrast to earthquakes and volcanic eruptions, these climate-related extreme weather events are increasing exponentially, which arouses concern.

Figures 03: Trends

Extreme Weather Events



Geological Events

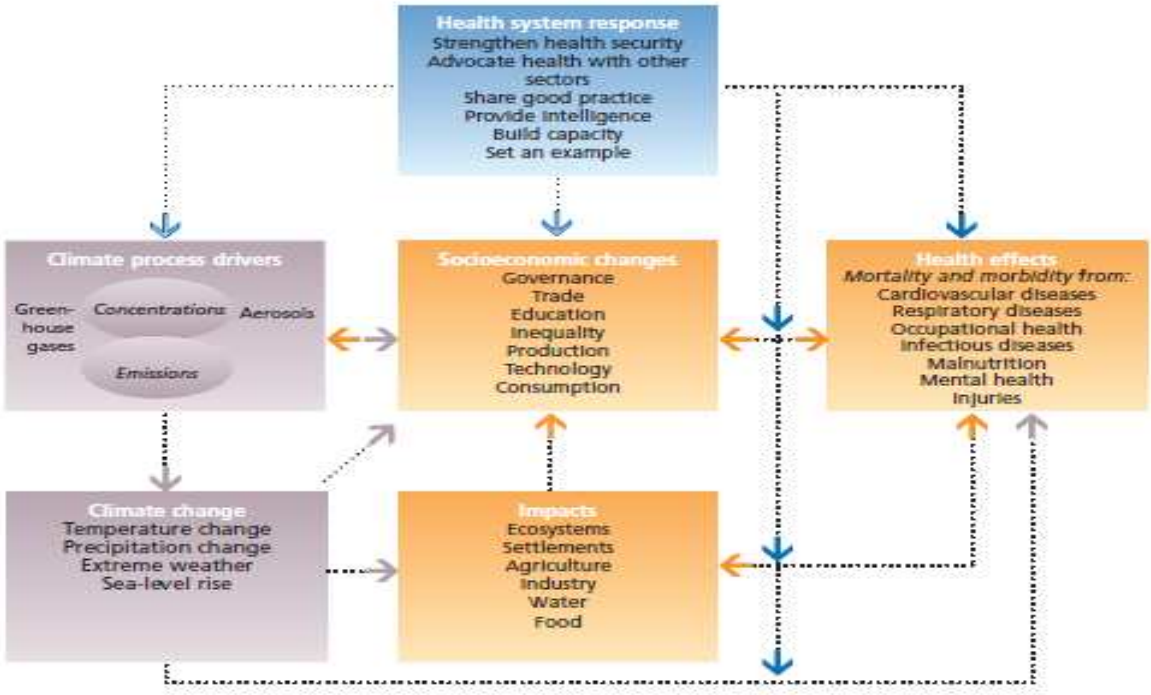


Source: Louvain, Ecole de Santé Publique, Universitè Catholique de Louvain Centre for Research on the Epidemiology of Disasters (CRED), Emergency Events Database, 2008

The human cost of these climatic events directly depends on the vulnerability of the people exposed. Social and environmental determinants of health, such as poverty, support systems, concurrent environmental stresses (including polluted water, unprotected waste disposal or polluted air) and displacement, all contribute to population vulnerability. These direct and indirect exposures can result in a variety of health impacts, as outlined in the Figure below.

[13] Louvain, Ecole de Santé Publique, Universitè Catholique de Louvain Centre for Research on the Epidemiology of Disasters (CRED), *Emergency Events Database*, 2008

Figure 04: Relationship between Climate Change and Human Health



Although climate change could have some short-term benefits, such as reduced winter mortality due to increases in temperature, most health impacts are anticipated to be negative and profoundly worse if current accelerating trends continue unabated.

The following are the actions approved by Government:

Action	Type	Owner	Cost Impact	Date
Action 58 **The Department for the Care of the Elderly will endeavor to have all health-care facilities and homes for older persons are equipped with air-conditioning facilities and/or cool rooms as appropriate, to be prepared against the eventuality of more frequent and more prolonged heat waves.**	Policy	**MHEC** DCE	Medium financial impact	Immediate
Action 59 **The Department for the Care of the Elderly will work to ensure that homes for elderly persons and healthcare facilities safeguard the health of residents from projected higher summer temperatures and more frequent heat waves; and if necessary establish legally binding standards such as, for example, compulsory monitoring of indoor ambient air temperature**.	Policy	**MHEC** DCE	Medium financial impact	Immediate
Action 60 **The Ministry for Health will assess and identify measures required to strengthen the continuous and rigorous surveillance of infectious diseases and their vectors; for the undertaking of a proper risk assessment, for the identification of measures to reduce the possibility of outbreaks of climate change related vector-borne diseases, and to ensure that, in the event that an outbreak does occur, a plan is in place to control the outbreak as early as possible.**	Monitoring	**MHEC** UoM	Low financial impact	Immediate

Action 61 **The Ministry for Health will assess and determine the local entomological expertise required for the relevant identification and mapping of distribution of vectors that carry disease and to take appropriate measures to address arising gaps.**	Monitoring	**MHEC** UoM	Not known	Immediate
Action 62 **The Ministry for Health will continue to maintain and where appropriate strengthen programmes directed to reduce the potential risk on food safety, given that the projected climatic scenario for the Maltese islands is likely to have an adverse effect on food safety with the subsequent risk of food-borne illness.**	Education	**MHEC**	Low financial impact	Underway
Action 63 **The Ministry for Health will ensure that early warning systems, in particular for heat waves / high temperatures and flooding events, are maintained, developed and strengthened.**	Monitoring	Met Office MHEC Civil Protection Department of Agriculture (MRRA)	Requires assessment	Continue/ re-enforce
Action 64 **The Government shall take upon the recommendation of the Committee that education campaigns on adaptation to climate change should focus on health issues. Local research indicates that the public is more willing to change their lifestyle and to be supportive of climate change policy if it is presented in this manner.**	Education	MRA MHEC	Low financial impact	Immediate

07. Tourism and Adaptation

As stated in the draft strategy document, local comprehensive studies of the likely impacts of climate change on tourism for the Maltese Islands have not been carried out. The following are the actions approved by Government:

Action	Type	Owner	Cost Impact	Date
Action 65 **The Parliamentary Secretariat for Tourism, the Malta Tourism Authority, the Malta Hotels and Retailers Association, and other stakeholders shall complete by June 2013, a detailed and comprehensive analysis of international and local data with regards to the impact of climate change on the Southern Mediterranean in general, and on Malta specifically, and subsequently to identify the macro as well as micro impacts on the tourism industry in Malta. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.**	Policy	OPM MTA UoM / Higher education institutions	Low financial impact	June 2013
Action 66 **The Parliamentary Secretariat for Tourism, the Malta Tourism Authority, the Malta Hotels and Retailers Association, shall complete by June 2013, a detailed and comprehensive analysis of how water resources scarcities will affect the tourism industry in general, and micro segments of the tourism industry specifically, such as for example, agro- and eco-tourism; the impact this will**	Policy	OPM MTA UoM / Higher education institutions	Low financial impact	June 2013

have on the competitiveness of the tourism industry; and the adaptation measures required to counter climate change effects and retain Malta as an attractive and competitive destination. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.				
Action 67 **The Parliamentary Secretariat for Tourism, the Malta Tourism Authority, the Malta Hotels and Retailers Association, and other stakeholders shall complete by June 2013, a detailed and comprehensive analysis of the impact of winter and summer energy and power demand of hotels and other tourist establishments as a result of anticipated changes in climate behaviour, the impact this will have on the competitiveness of the tourism industry, and the adaptation measures required to counter climate change effects and retain Malta as an attractive and competitive destination. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.**	Policy	OPM MTA UoM / Higher education institutions	Low financial impact	June 2013
Action 68 **The Parliamentary Secretariat for Tourism, the Malta Tourism Authority, the Malta Hotels and Retailers Association, and other stakeholders shall complete by June 2013, a detailed and comprehensive analysis of the impact of the anticipated climate changes on energy, water, and road infrastructure; on the historical heritage; on the landscape; and on the rural**	Policy	OPM MTA UoM / Higher education institutions	Low financial impact	June 2013

environment. The study should seek to assess the actual physical cost of repair arising from damages to the infrastructure; the actual and opportunity cost this may have on the tourism services sector; and present specific adaptation measures in this regard. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.				
Action 69 **The Malta Tourism Authority will seek to establish strong institutional links with the University of Malta as well as other stakeholders to undertake a series of focused studies directed at different aspects of the tourism industry and the related potential climate change impact to be completed by June 2013.**	Policy	OPM MTA UoM / Higher education institutions	Low financial impact	June 2013
Action 70 **The Malta Tourism Authority, building on the work of the aforementioned studies, shall draw up a Tourism Action and Contingency Plan by December 2014 that incorporates both mitigation and adaptation measures specific to the tourism sector. In doing so the Malta Tourism Authority should support this work through research studies undertaken by under-graduates, post-graduate and doctoral students.**	Policy	OPM MTA UoM / Higher education institutions	Low financial impact	December 2014

The following are the actions approved by Government:

Action	Type	Owner	Cost Impact	Date
Action 71 **The Government will assess the recommendation of the Committee that revenues generated from the auctioning of allowances, including revenue generated from the aviation sector, under the Emissions Trading Scheme are channelled towards the financing of a Climate Change Adaptation National Emergency Fund.**	Financing	MRA MRRA MFEI	Medium to high financial impact	To be determined
Action 72 **The Malta Resources Authority will steward discussion amongst stakeholders to identify suitable mechanisms and instruments that will ensure that the insurance market remains sustainable in the event of increasing unpredictability of climate change impacts on various sectors in Malta.**	Financing	MRA MRRA MFEI	Medium to high financial impact	Immediate

The Council will be constituted as follows:

Minister for Climate Change: Chair
Person to be nominated by the Minister for Climate Chair: Vice Chair.

A representative from each of the following Institutes / Departments of the University of Malta / Higher Education Institutions:

Department of Physics
Department of Architecture and Urban Design
Institute of Earth Systems
Department of Economics
Environment Design Unit
Euro-Mediterranean Centre on Insular Coastal Dynamics
International Environment Institute
Institute of Islands and Small States
Department of Media and Communications
Institute of Public Administration and Management
Department of Public Health
Division of Rural Sciences and Food Systems

A representative from each of the following Constituted Bodies:

General Retailers and Traders Union
Chamber of Commerce and Enterprise
General Workers Union
Union Haddiema Maghqudin
Malta Union of Teachers

A representative from each of the following Political Parties:

Partit Nazzjonalista
Partit Laburista
Alternattiva Demokratika

A representative from each of the following Non Government Organisations:

Nature Trust
Din L-Art Helwa
Friends of the Earth Movement
GAIA
Malta Energy Efficiency and Renewable Energy Association

A representative from each of the following Government entities:

Tourism and Sustainable Development Unit
MEPA
Wasteserv Ltd
Department of Agriculture
Malta Resources Authority
Enemalta Corporation
Transport Malta
Water Services Corporation.

Entities, Non Government Organisations and other stakeholders not represented above may apply to become members of the Council at any point in time. In the event that such an entity can contribute positively to climate change then the said entity will be appointed to the Council.

The Ministry acknowledges the following for contributing to its work:

- Local Councils Association
- Environmental Health Directorate
- Malta Resources Authority
- Malta Environment and Planning Authority
- Department of Public Policy, University of Malta
- Tourism and Sustainable Development Unit.

AEA Energy and Environment and Universidad de Politecnica de Madrid, (2007), *Adaptation to Climate Change in the Agricultural Sector, Report to the European Commission Directorate-General for Agriculture and Rural Development*

Climate Change Committee, National Climate Change Adaptation Strategy – Consultation Document, (2010), retrieved from http://mrra.gov.mt/page.aspx?id=124

Government of Malta, National Strategy for Policy and Abatement Measures relating to the Reduction of Greenhouse Gas Emissions, (2009), retrieved from http://mrra.gov.mt/page.aspx?id=124

Guereña A., Ruiz Ramos M., Diaz Hambrona C.H., Conde J.R., Minguez M.I., *Assessment of climate change in agriculture in Spain using climate models. Agronomy Journal 93*, 2001, 237-249

Karas, J., (2003), *Desertification — Climate Change and the Mediterranean Region*

Louvain, Ecole de Santé Publique, Universitè Catholique de Louvain Centre for Research on the Epidemiology of Disasters (CRED), (2008), *Emergency Events Database*

Ministry for Resources and Rural Affairs, Second National Communication to the UNFCCC, (2010), retrieved from http://mrra.gov.mt/page.aspx?id=124

Swart, R., Biesbroek, R., Binnerup, S., et al, (2009) Europe Adapts to Climate Change: Comparing National Adaptation Strategies, Partnership for European Environmental Research, Report No 1

Van Ittersum, M.K., S.M. Howden, and S. Asseng, (2003), *Sensitivity of productivity and deep drainage of wheat cropping systems in a Mediterranean environment to changes in CO2, temperature and precipitation. Agriculture Ecosystems and Environment*