The economic impact of climate change and adaptation in the Outermost Regions

Executive summary

June 2014

Regional and Urban Policy

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This report has been prepared by AMEC Environment & Infrastructure UK Limited in partnership with Bio Intelligence Service, Milieu Limited and Cambridge Econometrics.

Purpose of this Report

This report has been produced for the purpose of summarising the findings of the Study on the Impact of Climate Change and Adaptation Measures in the Outermost Regions (under framework CLIMA.A.4/FRA/2011/0027). The findings are based upon resources available in the public domain supplemented by consultation with representatives of the OR (although no field trips have been undertaken for this study). The findings presented are the considered views of the project team based upon the information available and used to inform the study.

Third-Party Disclaimer

Document Revisions

No.	Details	Date
1	Summary report	30 September 2013
2	Summary Final Report 14172i1	May 2014
3	Summary Final Report 14172i2	June 2014

1 Introduction

The Outermost regions

The Outermost Regions (OR) currently comprise nine regions within the EU which are geographically distant from the European continent but form an integral part of the EU member countries they belong to. There are nine Outermost Regions (OR), all islands except for French Guiana:

- Six French OR: Martinique, Guadeloupe, Saint-Martin and French Guiana in the Caribbean, and La Réunion and Mayotte (this latter OR since 1.1.2014) in the Indian Ocean;
- Two Portuguese OR: Madeira and the Azores, both in the Atlantic Ocean; and
- One Spanish OR: the Canary Islands in the Atlantic Ocean.

Purpose of this report

The Outermost Regions are particularly vulnerable to climate change impacts, due to a number of their shared characteristics:

- Concentration of population, activity and infrastructure along coastal zones, areas which will be at risk from sea level rise and coastal flooding;
- Dependence on water resources which are highly sensitive to changes in sea level (drought and risk of saltwater intrusion linked to changes in annual rainfall patterns);
- High sensitivity to extreme weather events (drought, flooding, hurricanes, cyclones); and
- A rich biodiversity and high concentration of endemic species, which may be threatened by changes in rainfall and temperature, but also by the introduction or increase of pests and invasive species.

The Commission, recognising the climate change vulnerability of the OR[1], commissioned this report to examine the economic impact of climate change and adaptation in the OR.

2 Climate change and the Outermost Regions

Climate Modelling – data sources

As a consequence of their size, topography and location, there is currently limited climate model data available for the majority of the OR and hence there is uncertainty in future projections of climate change. The Intergovernmental Panel on Climate Change fourth climate change assessment report (IPCC AR4) does however synthesise the information available at the time of publication into a single source of consistent information for all ORs. The IPCC AR4 assessment includes presentation of projections based on a Multi-Model Dataset (MMD) developed using the output of a number of climate models. This means that the MMD projections are not biased towards any one model and that they minimise uncertainty in projections for the OR.

Given the limitations of the climate model data available for the OR islands, we have used the IPCC AR4 to provide qualitative guidance on climate trends for the future (e.g. wetter, drier, warmer), rather than focussing on specific climate scenario projections and timescales. We have also drawn from additional data sources such as local modelling, to supplement the MMD where possible.

Biophysical impacts of climate change in the OR

The OR are subject to a number of biophysical impacts due to climate change. These include:

- Increased risk of flood due to increasing frequency of storms and extreme rainfall events;
- Increase in coastal flooding due to increase in storms and sea-level rise;
- Increase in water temperatures and ocean acidification leading to coral bleaching;

[1] In the document 'Regions 2020 an assessment of future challenges for EU regions SEC (2008)' working document.

- Saltwater intrusion (the intrusion of saltwater into freshwater aquifers, which can lead to potential contamination of drinking water sources);
- Change to annual patterns of rainfall (e.g. wetter winters but drier summers);
- Drought;
- Increased risk of heat related mortality as temperatures increase (particularly associated with heat wave);
- Increase in pests and invasive species;
- Increase in human diseases;
- Soil degradation;
- Increased risk of landslides/mudslides; and
- Increased risk of wildfire.

Climate impacts relevant to each OR, based on climate modelling data, a literature review and consultation with representatives of the OR has been used to undertake climate risk assessment.

Climate impact assessment for the OR

An assessment framework providing information on the current knowledge of climate impacts in the OR has been developed. The impacts have been assessed for each OR across 13 sectors. The sectors are:

- 7 economic sectors:
  - agriculture and forestry
  - energy
  - construction and buildings
  - waste
  - tourism
  - fisheries & aquaculture
  - transport
- 6 human and environmental systems:
  - health
  - coastal zone management
  - water
  - biodiversity
  - soil
  - disaster & risk

Each climate change impact has been given a score for **impact** (low, medium or high) and **vulnerability** (low, medium, high).

A climate impact is scored on **impact** according to:
- Whether the impact is positive or negative;
- The likelihood of the impact occurring; and
- The magnitude of the impact in the OR on the sector assessed.

The vulnerability of each sector to a climate impact is evaluated according to:
- Importance of the sector to the economy of the OR;
- The level of awareness of potential impacts within the OR and evidence of OR preparedness; and
- The level of adaptive capacity.

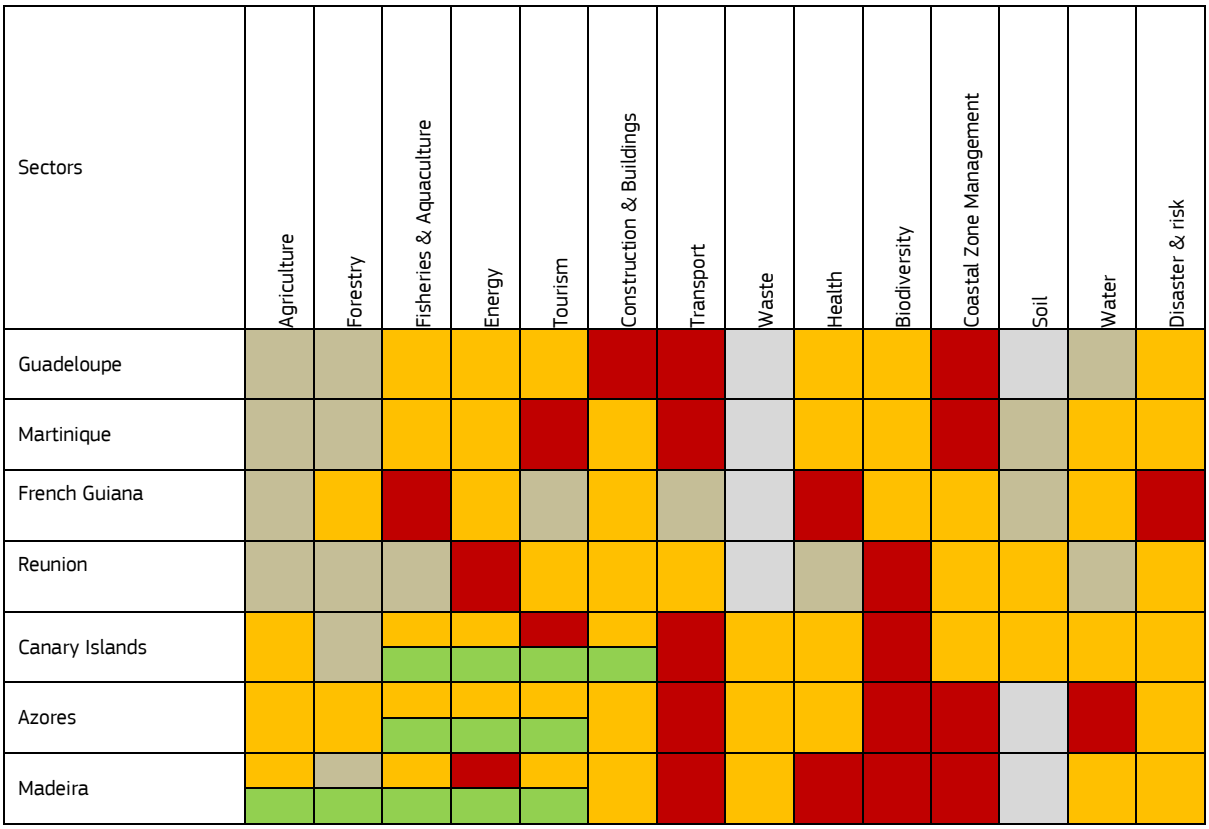
Combining the **impact** and **vulnerability** scores gives an assessment of the level of **risk or opportunity[2].**

For example, the climate impact *'Coastal inundation as a result of seal level rise'* – for the Construction & Buildings Sector in a number of ORs, has a high score for both **Impact** and **Vulnerability**, giving an the overall rating as High.

This provides information on the risks and opportunities from climate change for each OR, and highlights key risks. The **Error! Reference source not found.** below summarises risks and opportunities across he seven economic sectors and six human and environmental systems for all the OR.

[2] Impact x Vulnerability = Risk / Opportunity

Table 1 Risks and opportunities from climate change to the OR on a sector-by-sector basis



Notes: Colour coding of the cells in the risk matrix: Red – high risk, Orange – moderate risk, Olive – low risk, Green – opportunity, Grey – the risk is relevant to the sector however could not be assessed. Blank – impacts not relevant to the sector.

Due to a lack of detailed information specific to Mayotte and St Martin, it has not been possible to carry out a full climate impact assessment for these two islands. However, the literature review has identified some risks: for Mayotte, the available information principally refers to climate change impacts and risk to the biodiversity of Mayotte.
For Saint-Martin, exposure to hurricane risk and the vulnerability of the highly urbanised coastline to sea level rise appear to be the most researched impacts of climate change.

3 Economic impacts of climate change on the OR

The purpose of the economic part of the study is to gain insight into the economics of climate risks identified through the climate risk assessment.
Due to the limited data available, it was not sensible to carry out a full economic assessment. Instead we have provided some economic context, and, where possible, qualitative assessment of climate impacts' implications and importance for each OR.

The key data source for this research was Eurostat, which provided data on Gross Value Added (GVA) and employment, both by economic sector. In addition, data from the World Travel & Tourism Council (WTTC) on the contribution of tourism to GVA was available for three ORs: Guadeloupe, Martinique and Reunion. This data from the WTTC was used to supplement Eurostat data.

The initial part of the assessment made use of the Eurostat data to establish a sense of the relative economic importance of each aspect to the OR economies, for example analysis of the contribution of a particular sector (e.g. agriculture) to economic growth.

In addition, a **sector-level** economic assessment was carried out, focussed on the Agriculture and Tourism sectors, assessing the contribution of these sectors to the OR economy.

Efforts were made to assess the economic impacts of climate impacts upon the OR economies, using knowledge of past impacts (e.g. extreme weather events, storms, flooding) and economic data (e.g. GVA by sector) in their aftermath. However, a number of limiting factors must be taken into account:

- In some sectors – e.g. agriculture – effects of impacts are likely to be non-linear: a single large impact would likely have larger effects than the sum of ten impacts with magnitude one-tenth of the single one;
- The effect of a climate impact may depend upon the seasonality of the impact – e.g. drought will affect agricultural GVA differently if it is a winter or a summer drought; and
- Given the quality of the data available, establishing causality between an event - e.g. drought – and any corresponding change in agriculture GVA, is difficult.

The analysis also considers the size of EU subsidies compared to the size of each OR's economy (as measured by total GVA).

4 Assessment of EU funds

We have analysed the adaptation and mainstreaming measures implemented in the OR under EU funds, with particular focus on the Cohesion Policy funds, Common Agricultural Policy (CAP) rural development funds (known as European Agricultural Fund for Rural Development - EAFRD funds), and Common Fisheries Policy funds.

EU funding supports adaptation either by directly promoting climate change initiatives and policies, or by making investments "climate resilient" by ensuring they take climate change into account. For example, in almost all the OR, measures funded by the Cohesion Fund and the European Agricultural Fund for Rural Development include water management, the adoption of extreme weather resilient infrastructures, and the preservation and protection of natural heritage

Overall, EU funding plays a critical role in the development of the OR, particularly with regard to the planning and financing of infrastructure.

The agriculture, fisheries and tourism sectors are the main sources of employment for the four million inhabitants of the OR regions. These sectors are also those most affected by climate change - the adoption of measures to counteract these effects is therefore necessary, and EU funds play a crucial role in this.

Many existing EU funding mechanisms, which aim to increase competitiveness, regional integration and accessibility, are already being used to address the specific needs of the OR. In addition the OR benefit from specific public aid schemes and are granted special tax regimes due to their situation.

Of particular interest are the measures implemented through the following three funding streams:

- The Cohesion Policy Funds: the European Rural Development Fund (ERDF) and the cohesion Fund (CF) are adaptation relevant for example through funding investments in risk prevention measures (biodiversity conservation, water supply and wastewater treatment);
- The Common Agricultural Policy (CAP): the European Agricultural Fund for Rural Development (EAFRD) funds rural development programme in the EU Member States and regions. Programmes are grouped around 4 axes, two of which are relevant to adaptation: Improving the competitiveness of the agricultural and forestry sector (axis 1), Improving the environment and the countryside (axis 2); and

- Common Fisheries Policy: the European Fisheries Fund provides funding to help the fishing industry and coastal communities adapt to changing conditions, which could include climate change adaptation.

Table 2 below provides a summary overview of the main EU funding opportunities for the OR.

Table 2 Overview of the main EU Funds for the OR in the period 2007-2013

Funding Instrument		Beneficiary OR	EU allocation
EU Cohesion Policy			
ERDF	**European Regional Development Fund**	All	EUR 4,500 million
	INTERREG IVB MAC programme	Madeira, Azores, Canary Islands + neighbouring	EUR 55.3 million
	INTERREG IVB Caribbean programme	Martinique, Guadeloupe, French Guiana, St Martin + neighbouring	EUR 64 million
	INTERREG IVB Indian Ocean programme	Reunion, Mayotte + neighbouring	EUR 47 million
	INTERREG IVB Amazonia programme	French Guiana	EUR 12.8 million
CF	**Cohesion Fund**	Azores Madeira Canaries*	EUR 70 million EUR 100 million n\a
ESF	**European Social Fund**	All	EUR 1,300 million
Common Agricultural Policy			
EAFRD	**European Agricultural Fund for Rural Development**	All	EUR 1,200 million
POSEI**	**Programme of Options Specifically Relating to Remoteness and Insularity**	All	EUR 4,160 million
Common Fisheries Policy			
EFF	**European Fisheries Fund**	All	EUR 101.4 million

Source: DG Regio website, own compilation

** The Cohesion Fund in Spain is implemented through a National level Operational Programme called Operational Programme Cohesion Fund – ERDF. The amount of Cohesion Fund specifically dedicated to the Canary Islands is not available, however the Canary Islands have used the fund to develop port infrastructure, including a new seawall and dock in the port of Las Palmas[3].*

*** POSEI programmes are financed under the European Agricultural Guidance and Guarantee Fund (EAGGF). The POSEI system was set up in 2001. It provides grants for production, processing and marketing of agricultural products in the OR.*

In addition there are other EU funding programmes which the OR may use, including:

- Research Policy through the EU 7th Framework Programme, as the OR have potential for research & innovation due to their singular characteristics;
- BEST Preparatory action – Voluntary scheme for Biodiversity and Ecosystem Services in territories of the OR and OCT;
- European Union Solidarity Fund. This offers financial support following major natural disasters, and was set up after the severe flooding event in Central Europe in the summer of 2003; and

[3] Court of Auditors (2012), Special Report No 4 / 2012 – Using Structural and Cohesion Funds to co-finance transport infrastructures in seaports: an effective investment?, p.30

- While not direct funding, the European Investment Bank provides loans to the OR in support of projects contributing to improving the quality of life of residents and investment in infrastructure in transport and telecommunications – which will increase resilience to climate impacts.

Table 3 Breakdown of ERDF allocations relevant for climate change adaptation in the ORs for the period 2007-2013

	ERDF allocations	Directly adaptation relevant	Indirectly adaptation relevant
Guadeloupe	EUR 542 million	EUR 15.8 million	EUR 82.4 million
Martinique	EUR 417 million	EUR 54.6 million	EUR 38.7 million
French Guiana	EUR 305 million	EUR 1 million	EUR 23 million
Reunion	EUR 1,000 million	EUR 16.9 million	EUR 179 million
Canary Islands	EUR 1,000 million	/[4]	EUR 66 million
Azores	EUR 966 million	EUR 38.2 million	EUR 149.6 million
Madeira	EUR 321 million	EUR 14.5 million	EUR 37.7 million

Source: Financial tables in each Operational Programme

5 Socio-Economic Impacts of Climate change in the OR

This brings together the assessment of economic impacts of climate change to the OR with the assessment of EU funds available to the OR.

To date impacts of climate change on the OR economies have included:

- An increase in Construction & Buildings GVA following an extreme event (flood, storm) which resulted in damage to existing infrastructure;
- A reduction in agricultural GVA following an extreme event such a hurricane causing damage to crops; and
- It must be taken into consideration that it is often difficult to establish correlation (let alone causation) between an extreme event and a change in sectoral GVA, e.g. changes in tourism GVA following from floods or storms.

The tables below provide an overview of the contribution of agriculture and tourism to the economies of the OR.

Table 4 is drawn from Eurostat information available for all the OR. It includes three indicators:

- Average share of agriculture in total GVA highlights the importance of agriculture to the economy of the OR as a whole;
- GVA per hectare of land provides an approximate indicator of the productivity of the land, and the likely magnitude of the effects upon an OR if a climate impact affects the land; and
- Number of hotel nights spend in the OR by non-residents gives an indication of the importance of tourism in the OR – although the OR vary significantly in size and population, and this is an absolute rather than per capita figure.

[4] No direct adaptation relevant measure is co-financed by the ERDF in the Canary Islands. The Convergence Operational Programme for the Canary Islands allocates ERDF funding only to code 45 – water management, and code 51 – promotion of biodiversity and nature protection which are considered indirectly relevant measures by the methodology.

Table 4 Sector metrics for agriculture and tourism sectors across all the OR

	Agriculture sector metrics		Tourism sector
	Average share of agriculture in total GVA (%)	**GVA per ha of utilised agricultural land (€/ha; 2000 prices)**	**Average nights spend by non-residents in hotels ('000s)**
Guadeloupe	3.5%	4,331.8	388
Martinique	3.3%	6,003.1	152.2
French Guiana	4.7%	4,071.8	54.5
La Réunion	2.1%	3,949.2	75.6
Canary Islands	1.7%	5,470.1	39,555
Azores	11.6%	2,091.9	584.3
Madeira	2.2%	11,448.5*	4,851.3

Notes:

Agriculture averages calculated over 2000-2006. Tourism GVA averages calculated over 2006-2009. Other tourism averages calculated over 2006-2011.

*For Madeira, agriculture averages were calculated over 2000-2006 except for agricultural land, where there is a clear outlier (an implausibly large value) in 2006 which has been excluded.

Sources: Calculations from Eurostat.

Additional tourism data on average spend per hotel night spent was available from the WTTC but only for three OR: Guadeloupe, Martinique, and La Réunion.

Drawing from this additional data, Table 5 below presents additional tourism metrics for these three OR as follows:

- Average direct contribution of tourism to economic activity - a measure of the value of trade that takes place directly with tourists;
- Total contribution of tourism to economic activity - takes into account wider effects from capital investment and government spending to support tourism, as well as supply-chain effects and the impact of wages from employment being spent in the OR. In general, it is the wider economic impact of the latter that matters in this assessment and it is usually this kind of figure that is reported in official publications; and
- Tourism GVA per night spent by a non-resident in a hotel in an OR is another metric presented, which provides a useful indication on the level of GVA generated by each night's stay.

Table 5 Detailed tourism sector metrics for Guadeloupe, Martinique and La Réunion

	Tourism sector metrics – Direct*		Tourism sector metrics – Total*	
	Average direct contribution of tourism to GVA (%)	**Tourism GVA per night spent in hotel (€; 2000 prices)**	**Average direct contribution of tourism to GVA (%)**	**Tourism GVA per night spent in hotel (€; 2000 prices)**
Guadeloupe	2.6%	371.4	17.9%	2,567.8
Martinique	2.7%	1,148.4	11.5%	4,963.1
La Réunion	2.9%	4,823.2	7.8%	12,936.5

Notes:

Agriculture averages calculated over 2000-2006. Tourism GVA averages calculated over 2006-2009. Other tourism averages calculated over 2006-2011.

***Tourism sector metrics** – **Direct** figures refer to the direct contribution / value of the tourism sector, whereas **Total** figures include wider impacts such as spending to support tourism activities, and wages generated by tourism and spent in the economy.

Sources: Calculations from Eurostat and WTTC.

Table 6 below summarises the EU funds received by the OR from the three key funding mechanisms relevant to adaptation actions: the European Regional Development Fund (ERDF) under the Cohesion Fund, the European Social Fund and the European Agricultural Fund for Development (EAFRD).

Table 6 Funding awarded in the period 2007-2013

	ERDF (European Regional Development Fund)	**ESF (European Social Fund)**	**Common Agricultural Policy (CAP) EAFRD (European Agricultural Fund for Development)**
Guadeloupe	543	185	142
Martinique	417	98	108
French Guiana	305	100	77
La Reunion	1,014	517	329
Canary Islands	1,019	117	154
Azores	966	190	294
Madeira	321	125	179

6 Summary assessment for each of the Outermost Regions

Presents a summary for each of the OR, summarising main points from the climate change risk assessment, socio-economic impacts, use of EU funding and examples of projects relevant to adaptation.

Table below provides an overview of the key messages and areas for adaptation intervention identified for each OR. Areas are highlighted as key due to the level of risk and vulnerability to the climate impacts identified, and the economic importance of the area to OR.

Since there is very little information for Mayotte and St Martin, perhaps the first adaptation actions for these should be to establish some information on them.

Table 7 Summary of key adaptation messages for the OR

	Key messages: Areas for adaptation intervention - Key messages
Guadeloupe	Construction, Transport and Tourism are key economic sector that should be considered a priority for adaptation (especially regarding the vulnerability of roads), Human health is a key social area to consider for adaptation actions, as there is a risk of increase in vector-borne diseases and deaths from flooding. Water is the environmental system where adaptation action is most urgent, in particular to mitigate water shortages. Coastal zone management – should undertake action to increase resilience to coastal flooding. Disaster prevention is key social area for adaptation action. Biodiversity is the environmental system where implementation of adaptation actions is most urgent, given that it is known to be at risk and it is of high value to Guadeloupe.
Martinique	Transport, Tourism and Construction are key economic sectors that should be considered as a priority for adaptation, especially regarding infrastructure damage and water shortages. Human health & disaster prevention are key social areas for adaptation action. Human vector-borne diseases and deaths may increase due to warmer climate conditions and increase in flooding. Agriculture is the environmental system where implementation of adaptation actions is most urgent. Coastal zone management is an important area where actions should be taken to increase resilience to coastal flooding. The impacts of coral bleaching and saltwater intrusion on fish stocks, tourism and increased risk of coastal flooding should be recorded.
French Guiana	Fisheries and Aquaculture, Construction and buildings are economic areas which should be considered as a priority for adaptation action due to their vulnerability to climate impacts; Biodiversity is the environmental system where implementation of adaptation actions is most urgent, given that it is known to be at risk and it is of high value to French Guiana. Disaster and risk management is a social area which should be considered a priority area for action given the vulnerability to impacts such as flooding and inundation. The threat of wildfires should be addressed.
La Reunion	Construction, Transport and Tourism are the key economic sectors that should be considered a priority for adaptation, especially regarding infrastructure damage, and in the case of tourism the spread of disease. Biodiversity is the environmental system where implementation of adaptation actions is most urgent, given the importance of biodiversity to La Reunion. Coastal zone management – should undertake action to increase resilience to coastal flooding. Human health & disaster prevention are key social areas for adaptation action. Vector-borne diseases and death due to warmer climate conditions may increase.
Canary Islands	Energy, Construction, Transport and Tourism are economic areas that should be considered a priority for adaptation, especially regarding infrastructure damage which may occur as a result of more intense and frequent climatic events (e.g. heavier rainfall causing floods). Biodiversity is the environmental system where implementation of adaptation actions is most urgent, given that it is known to be at risk and it is of high value to the Canary Islands (having a rich biodiversity and high number of

	Key messages: Areas for adaptation intervention - Key messages
	endemic species)..
	Coastal zone management is an important area where actions should be undertaken to increase resilience to coastal flooding.
	Human health & disaster prevention are key social areas for adaptation action. Human vector-borne diseases and deaths may increase due to warmer climate conditions and increase in flooding.
	New opportunities may arise in the tourism (longer summer season) and fisheries (due to new tropical species appearing) sectors.
	The renewable energy and buildings sector may also benefit from the need to adapt to climate change.
Azores	Agriculture and Tourism are key economic areas which should implement adaptation actions.
	Transport, Coastal Zone Management and Water are all priority infrastructure sectors which should implement adaptive actions, as they are at risk from an increase in floods and coastal flooding, saltwater intrusion, changes to rainfall patterns, and an increase in landslides.
	Biodiversity is the environmental system where implementation of adaptation actions is most urgent, given that it is known to be at risk and it is of high value to the Azores.
	Opportunities may arise in the tourism sector (through warmer winter facilitating longer tourist season) and fisheries sector (due to migration of new commercial species to Azores waters).
Madeira	Tourism, Energy, Construction and Transport are key economic areas for adaptive action.
	Human health is an area where an adaptive action is needed, as there is a risk of increase in vector-borne diseases due to warmer and dryer conditions.
	Tourism should take adaptive actions to improve resilience against risks including an increase in diseases, floods and coastal flooding.
	Energy, construction and transport sectors will benefit from adaptation actions to increase the resilience of infrastructures to flooding and landslides.
	Biodiversity is the environmental system where implementation of adaptation actions is most urgent, given that it is known to be at risk (from invasive species, fire, drought, floods, saltwater intrusion) and it is of high value to Madeira.
	Coastal zone management – should undertake action to increase resilience to coastal flooding.
	Water systems will benefit from adaptation action to enhance their resilience to drought.
	Opportunities may arise in the agriculture and forestry sectors if warmer annual temperatures enable the expansion of these industries into higher altitude areas.

7 Policy recommendations

This report argues that the OR must be reinforced against the risks of climate change and their capacity to adapt and to reduce the effects of catastrophe must be improved.

Mainstreaming climate change action into all relevant policies and taking appropriate adaptation and mitigation measures is key to the success of this strategy for the OR.

Resilience to climate change impacts has to be increased by supporting the climate change adaptation in all relevant sectors, and promoting a greener, low-carbon economy, the improvement of energy and resource efficiency as well as sustainability of transport and agriculture. Coastal protection is a particular concern for the OR. To achieve this, the OR should take advantage of the opportunities presented by different funding streams from the EU and beyond. The EU Cohesion Policy in particular will have the greatest impact on overall development of the ORs.

The EU Cohesion Policy can promote a more proactive and positive approach to climate change by raising awareness, implementing innovative approaches and encouraging initiatives to limit risks and impacts. For the 2014-2020 funding period, Cohesion Policy will have an increased focus on climate change, both mitigation and adaptation. Also for the first time, a dedicated funding objective for climate change adaptation has been proposed.

The **ERDF** and **Cohesion Fund** Regulations present a list of **priority actions** which are eligible for financing under this thematic objective. These include:

- Supporting dedicated investment for adaptation to climate change; and
- Promoting investment to address specific risks, ensuring disaster resilience and developing disaster management systems.

More concretely, actions that can be promoted under this objective include:

- Development of strategies and action plans for adaptation to climate change and risk prevention and management plans at national, regional and local level and building up a knowledge base and data observation capacities and mechanisms for the exchange of information;
- Increased investment in adaptation to climate change and risk prevention and management, including:
  - avoiding damage and increasing resilience to the built environment and other infrastructure;
  - protecting human health;
  - decreasing future pressure on water resources;
  - investing in flood and coastal defences; and
  - decreasing the vulnerability of ecosystems in order to increase ecosystem resilience and enable ecosystem-based adaptation.
- Development of tools (detection, early warning and alert systems, risk mapping and assessment); and
- Increased investment in disaster management systems, to facilitate disaster resilience and risk prevention and management of natural risks, including weather-related risks (such as storms, extreme temperature events, forest fires, droughts, floods) and geophysical risks (such as avalanches, landslides, earthquakes, volcanoes), and to support societal responses to industrial risks (early warning systems, risk mapping).

The following are **recommendations for ORs wishing to use Cohesion Funds to fund climate change adaptation in the period 2014-2020:**

- At Member State level: in order to **take advantage of the thematic objective dedicated to climate change adaptation**, Member States must select it as one of their priorities. As climate change adaptation is critical for the OR, OR will need to work closely with national-level authorities to ensure that the climate change adaptation thematic objective is adopted as one of the priority areas for funding. This will in turn enable the OR to dedicate more funding that directly addresses climate change adaptation;
- If the thematic objective addressing climate change adaptation is not selected by the Member States to which the OR belongs; there are still many ways in which **climate change adaptation can be directly funded through other thematic objectives**, such as those concerning environmental protection, research and technological development, and the integration of climate change adaptation and mitigation through support for low carbon economy;
- The OR should consider the Commission's working paper **"Technical Guidance on integrating climate change adaptation in programmes and investments of Cohesion Policy"**[5]. This paper accompanies the EU Strategy on adaptation to climate change and suggests how Member States and regions can better consider adaptation in all funding areas of Cohesion Policy. It considers both direct funding for climate change adaptation measures and also integrating adaptation concerns into all areas of spending; and
- Opportunities to fund adaptation-related initiatives through the **European Social Fund (ESF)** should be exploited. The ESF is now envisioned to support projects promoting the reform of education and training systems, adaptation of skills and qualifications, up-skilling of the labour force, and the creation of new jobs in sectors related to the environment and energy[6].

[5] Commission Staff Working Document SWD(2013) 135 final, 16.4.2013

[6] Regulation (EU) No 1304/2013 on the European Social Fund and repealing Regulation (EC) No 1081/2006, COM(2011)607, 6.10.2011, Brussels

In addition, there are **recommendations for integrating climate change adaptation into Cohesion Policy overall in the OR.** A new system of ex-ante conditionalities contains conditions that Member States must meet in order to receive funding. For the climate change adaptation objective, the ex-ante conditionality requires that Member States have national/regional risk assessment for disaster management in place[7]. The experience the ORs have in implementing disaster risk reduction can contribute greatly to the new concern of adaptation, in terms of policy and institutional approaches as well as technical methods and tools. It is therefore important that the two policy fields, disaster risk reduction and climate change adaptation, are integrated.

The opportunities for financing specific adaptation measures under different thematic objectives of the draft ERDF, ESF and Cohesion Fund Regulations are analyzed in Table 8 below. These are linked to the sectors in each Outermost Region that resulted most at risk from the vulnerability assessment developed in the framework of this project. These sectors should be prioritized in the next programming period.

[7] See Annex IV of the Common Provisions Regulation

Table 7 Opportunities for funding climate adaptation measures in Cohesion Policy

Indirect opportunities for climate action			
Thematic Objectives	**Selected Opportunities**	**Sector to prioritise**	**ORs**
TO 1 Strengthening research, technological development and innovation.	**Selected relevant activities proposed in the Regulations** • Enhancing research and innovation infrastructure (R&I) and capacities to develop R&I excellence and promoting centres of competence, in particular those of European interest. (ERDF) • Promoting business R&I investment, product and service development, technology transfer, social innovation and public service application, demand simulation, networking, clusters and open innovation through smart specialisation (ERDF) • supporting technological and applied research, pilot lines, early product validation actions, advanced manufacturing capabilities and first production in Key Enabling Technologies and diffusion of general purpose technologies (ERDF)	**Research**	**All**
TO 2 Enhancing access to and use and quality of ICT	**Selected relevant activities proposed in the Regulations** • Strengthening ICT application for e-government, e-learning, e-inclusion and e-health. (ERDF)	**Research**	**All**
TO 4 Shift towards a low-carbon economy in all sectors	**Selected relevant activities proposed in the Regulation** • Promoting low-carbon strategies for all territories, particularly urban areas; (ERDF & Cohesion Fund) • Promoting the production and distribution of renewable energy sources; (ERDF) • Promoting energy efficiency and renewable energy use in enterprises; (ERDF) • Supporting energy efficiency, smart energy management and renewable energy use in public infrastructures, including in public buildings, and in the housing sector; (ERDF) • Promoting research and innovation in, and adoption of, low-carbon strategies; (ERDF) • Promoting the used of high-efficiency co-generation of heat and power based on useful heat demand. (ERDF)	**Energy**	**Canary Islands** **Azores** **Madeira** **Reunion**
TO 5 Promoting climate change adaptation, risk prevention and management"	**Selected relevant activities proposed in the Regulations** • Supporting investment for adaptation to climate change, including ecosystem-based approaches; (ERDF) • Promoting investment to address specific risks, ensuring disaster resilience and developing disaster management systems. (ERDF)	**Disaster risk**	**Canary Islands** **Azores** **Guadeloupe** **Martinique** **Reunion**
TO 6 Protecting the environment and promoting resources efficiency	**Selected relevant activities proposed in the Regulation** • Addressing the significant needs for investment in the waste and water sector to meet the requirements of the environmental acquis; (ERDF and Cohesion Fund) • Promoting innovative technologies to improve environmental protection and resource efficiency in the waste sector, water sector and with regard to soil, or to reduce air pollution. (ERDF)	**Water/ coastal zone management**	**Canary Islands** **Azores** **Madeira** **Guadeloupe** **Martinique**
	• Conserving, protecting, promoting and developing natural and cultural heritage; (ERDF and Cohesion Fund)	**Tourism**	**Canary Islands** **Azores** **Madeira** **Guadeloupe** **Martinique** **Reunion**

Indirect opportunities for climate action			
Thematic Objectives	**Selected Opportunities**	**Sector to prioritise**	**ORs**
	• Taking action to improve the urban environment, to revitalise cities, regenerate and decontaminate brownfield sites, reduce air pollution and promote noise-reduction measures. (ERDF and Cohesion Fund) • Supporting industrial transition towards a resource- efficient economy, promoting green growth, eco-innovation and environmental performance management in the public and private sectors. (ERDF)	**Construction and Buildings**	**Canary Islands Madeira Guadeloupe Martinique Reunion**
	• Protecting and restoring biodiversity, soil protection and promoting ecosystem services including NATURA 2000 and green infrastructure. ERDF)	**Biodiversity**	**All**
TO 7 Promoting sustainable transport and removing bottlenecks in key network infrastructures	**Selected relevant activities proposed in the Regulations** • Developing and improving environment-friendly and low-carbon transport systems, including inland waterways and maritime transport, ports, multimodal links and airport infrastructure, in order to promote sustainable regional and local mobility; (ERDF) • Enhancing regional mobility by connecting secondary and tertiary nodes to TEN-T infrastructure, including multimodal nodes; (ERDF) • Developing and rehabilitating comprehensive, high quality and interoperable railways systems, and promoting noise reduction measures. (ERDF)	**Transport**	**Canary Islands Azores Madeira Guadeloupe Martinique Reunion**
	• Improving energy efficiency and security of supply through the development of smart energy distribution, storage and transmission systems and through the integration of distributed generation from renewable sources. (ERDF)	**Energy**	**Canary Islands Azores Madeira Réunion**
Cross-cutting for all 11 TO Sustainable urban development	**Selected relevant activities proposed in the Regulations** • The ERDF Regulation envisages ring-fencing 5 % of funding for integrated sustainable urban development measures and for the setting up of an urban development platform to promote exchanges between cities. (ERDF)	**Construction and Buildings**	**Canary Islands Madeira Guadeloupe Martinique Reunion**
TO 9 Promoting social inclusion and combating poverty	**Selected relevant activities proposed in the Regulations** • Investing in health and social infrastructure which contribute to national, regional and local development, reducing inequalities in terms of health status, promoting social inclusion through improved access to social, cultural and recreational services and transition from institutional to community-based services; (ERDF) • Enhancing access to affordable, sustainable and high-quality services, including health care and social services of general interest; (ESF) • Undertaking investment in the context of community-led local development strategies. (ESF and ERDF)	**Health**	**Canary Islands Madeira Guadeloupe Martinique French Guiana Réunion**
TO 10 Investing in education, skills and lifelong learning	**Selected relevant activities proposed in the Regulations** ▪ Enhancing access to lifelong learning, upgrading the skills and competences of the workforce and increasing the labour market relevance of education and training systems.	**Awareness raising**	**All**
TO 11 Enhancing institutional capacity and an efficient public administration	**Selected relevant activities proposed in the Regulations** • Investment in institutional capacity and in the efficiency of public administrations and public services with a view to reforms, better regulation and good governance; (ESF) • Capacity building for all stakeholders education, lifelong learning, training and employment and social policies, including through sectoral and territorial pacts to mobilise for reform at the national, regional and local levels. (ESF)	**Technical assistance**	**All**

Note – this is a compilation based on the Cohesion Policy Regulations

This list of non-exhaustive options illustrates possible measures in relation to opportunities in Regulations, eligibility for funding under ERDF and CF and their link to the different thematic objectives, and related sectors. It is a guiding tool for regional authorities to develop adaptation options based on regional circumstances, needs and priorities.

The development of basic infrastructure remains a priority, particularly for the less developed OR[8]. Therefore efforts should be made to ensure that all future infrastructures (energy, transport, environment, buildings) are **climate proofed**, that is, that a proportion of their budget should be allocated to designing solutions for reducing risks and improving their resilience to climate change impacts. Funding should be conditional on compliance with this rule.

At the same time, operational guidelines should also introduce **sustainability criteria** for investments which ensure that certain types of adaptation measures (e.g. infrastructure like dams and dikes) do not impose unintended negative impacts on the natural environment (maladaptation). In this respect, the criteria should also indicate possible 'green' adaptation options which include ecosystem-based approaches and soft measures in terms of administrative capacity which are often more cost-efficient and contribute to the creation of new jobs and business opportunities.

Table 8 below lists some examples of prevention and adaptation measures which can be financed with the support of Cohesion Policy Funds, with the aim of mainstreaming climate change and climate proofing investments under different sectors. A long list of adaptation options is provided by the report "Climate proofing CAP and Cohesion Policy"[9].

Table 8 Examples of adaptation measures financed under Cohesion Policy

Sector	Prevention and adaptation measures
Disaster & Risk	▪ Information and Monitoring system on spread and relevance of vector-borne, food-borne diseases ▪ Protection from forest fires ▪ Soft coastal defences ▪ Flood gates (with impacts for several policy fields) ▪ Heat Warning System
Energy	▪ Energy efficient adaptation of homes, offices, industrial plants to heat (e.g. passive cooling systems) ▪ Increase robustness of transmission grids to storm damages ▪ Adjustments in design standards for wind turbine generators (consideration of extreme storm)
Construction & Buildings	▪ Protection of buildings from storms, extreme precipitation ▪ Strategic urban and regional planning to prevent further accumulation of assets in vulnerable areas ▪ Green and blue Spaces, including green roofs ▪ More water-efficient building constructions
Water	▪ Additional rain overflow basins to adapt sewage system against flooding, enhancing water storage capacity of reservoirs ▪ Adaptation to sewage systems against droughts and low-water level ▪ River restoration (buffer zone), restoration of wetlands ▪ Demand management

[8] European Commission: (2012) Second Forum of Outermost Regions: working together towards Europe 2020, Summary
[9] http://climate-adapt.eea.europa.eu/

Sector	Prevention and adaptation measures
	▪ Desalination of water ▪ Sustainable urban drainage systems
Biodiversity	▪ Further conservation areas and habitat recreation ▪ Maintaining and improving habitat management (conservation management, green corridors, etc.)
Health	▪ Energy efficient cooling of hospitals ▪ Additional care and support of vulnerable citizens through health infrastructure (workers, buildings)
Transport	▪ Heat-resistant asphalt and adjustment of maintenance ▪ Retrofitting existing road infrastructure concerning increased precipitation ▪ Adjustments of maintenance of rail infrastructures ▪ Adaptation of rail infrastructure to heat and temperature change ▪ Retrofitting airports against higher precipitation ▪ Retrofitting existing infrastructure of shipping concerning extreme events ▪ Adequate design and maintenance of bridges and tunnels ▪ Vegetation management along roads and rails
Tourism	▪ Diversification of tourist offers in different regions (winter and summer tourism)
Other	▪ Awareness raising and information sources, especially for small-scale project developers ▪ Awareness raising to companies regarding adaptation to climate change

Under the Cohesion Fund, it is also suggested that investments in the OR focus on options that of a **cross-cutting nature and concerning soft measures**, e.g. developing the knowledge base and tools for risk assessment as well as awareness-raising of public administrations. Such measures should be considered in all regions under 2014-2020 EU Cohesion Policy for three reasons: Firstly, they could improve the overall planning processes at regional levels linking forecasts on climate change impacts/costs to investment planning. Secondly, they could lead to more autonomous adaptation in the long-term and reduce the need for EU intervention. Thirdly, they could enhance the ability and skills of regional authorities to develop bottom-up options that are better suited to their local circumstances[10].

Common Agricultural Policy

Addressing the challenges presented by climate change is signalled as an important priority for the CAP in the legislative proposals for the 2014-2020 programming period. A political agreement was reached in June 2013 and the formal adoption of the reform came at the end of 2013[11].

The climate focus is particularly highlighted in relation to rural development policy[12], where climate adaptation features much more strongly as an objective within the Regulations for 2014-2020 than has

[10] Hjerp, P., Volkery, A., Lückge, A., Medhurst, J., Hart, K., Medarova-Bergstrom, K., Tröltszsch, J., McGuinn, J., Skinner, I., Desbarats, J., Slater, C., Bartel, A., and ten Brink, P., (2012), *Methodologies for Climate Proofing Investments and Measures under Cohesion and Regional Policy and the Common Agricultural Policy*, A report for DG Climate, August 2012

[11] http://europa.eu/rapid/press-release_MEMO-13-1157_en.htm

[12] Regulation (EU) No 1306/2013 of the European Parliament and of the Council on the financing, management and monitoring of the common agricultural policy, COM(2011) 628/3, 2011/0288(COD)

been the case in the past[13]. Of the priorities for rural development that are of most relevance to climate adaptation are the following:

- Fostering knowledge transfer and innovation (priority 1);
- Enhancing the competitiveness of agriculture and farm viability (Priority 2);
- Restoring, preserving and enhancing ecosystems (Priority 4); and
- Promoting resource efficiency and transition to a low carbon economy (priority 5).

Recommendations for funding climate change adaptation through CAP 2014-2020 in the ORs

The **six priorities** that replace the current axis structure of the EAFRD introduce more flexibility as there are no longer any constraints on which measures can be used to deliver which priority. This should help to increase the scope and incentive for the ORs to address these priorities as creatively as possible and to use packages of measures to deliver the needs identified within their programmes.

There is a new requirement that the six Union priorities for rural development all contribute to the **cross-cutting objective of innovation, environment and climate change mitigation and adaptation**. This should help ensure that climate proofing takes place during RDP design and should aid in building synergies between different priorities, objectives and measures to deliver multiple objectives.

A number of **rural development measures** are particularly relevant for addressing adaptation:

- The **agri-environmental-climate measure** (Article 28), which provides support to farmers for adopting environmental or climate related management on their land;
- **Investments in physical assets** (Article 17), providing support for investments in 'tangible and/or intangible investments which can improve the competitiveness of the business or be non-productive in nature, linked to achieving requirements under the agri-environment-climate or forest-environment measures;
- **Natura 2000 and Water Framework Directive payments** (Article 30), compensating beneficiaries for the restrictions placed on them in these areas which are not experienced by those farmers/foresters outside these areas;
- Various **forestry measures**, in particular Article 22 for the afforestation and creation of woodland, Article 23 for the establishment of agri-forestry systems and Article 34 for forest-environmental and climate services and forest conservation; and
- **Knowledge transfer and information actions** (Article 14) and providing support for advisory services, farm management and farm relief services (Article 15).

Although not legally binding, the EAFRD Regulation includes a provision for **earmarking of funding for climate action**. Specifically, it is established that 30% of total EAFRD contribution should be included in each programme for action on climate change mitigation and adaptation as well as environmental issues by supporting agri-environment-climate, organic farming payments, and payments to areas facing natural or other specific constraints measures[14]. This provision specifically applies to the special conditions of the ORs.

[13] Hjerp, P., et al (2012) as above: *Methodologies for Climate Proofing Investments and Measures under Cohesion and Regional Policy and the Common Agricultural Policy*, A report for DG Climate, August 2012.

[14] Regulation (EU) No 1303/2013 of the European Parliament and of the Council of 17 December 2013 laying down common provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund, the European Agricultural Fund for Rural Development and the European Maritime and Fisheries Fund and laying down general provisions on the European Regional Development Fund, the European Social Fund, the Cohesion Fund and the European Maritime and Fisheries Fund and repealing Council Regulation (EC) No 1083/2006

Recommendations for integrating climate change adaptation into CAP overall for the OR

A number of **ex-ante conditionalities** have been introduced that Rural Development Programmes need to comply with before they can be approved. The conditions relevant for climate adaptation should help ensure climate adaptation issues are more fully considered in Member States, providing an improved foundation on which RDPs can build. These conditions include requiring the existence of **national risk assessment for disaster management** that takes into account climate adaptation; and requiring the presence of a **water pricing policy** to ensure a more efficient use of water (in the context of priority 5 on promoting resource efficiency).

Ensuring that any future investments in infrastructure are climate proofed will depend upon the establishment of suitable **project selection criteria** and safeguards. Article 45 sets out the eligibility criteria for investments, includes the provision that environmental impacts of investment operations need to be assessed. Similar provisions for climate adaptation should be added to require that all investments are assessed to ensure that they are resilient to future climate change and do not lead to maladaptation. Moreover, adaptation and climate-proofing safeguards should also be included in the **criteria for the selection of projects** (Article 49).

Other funding sources for ORs to fund adaptation actions:

Maritime Affairs and Fisheries
The Integrated Maritime Policy (IMP) and the Blue Growth initiative are of major importance to the OR, offering a new approach to maritime governance. The IMP has identified climate change as one of the main challenges. The IMP and the reformed Common Fisheries Policy will bring about a new 'Smart, Green Fisheries' which produces no discards and does not damage marine ecosystems. Additionally under the IMP there is support for themes which promote savings and encourage job growth, e.g. integrated coastal zone management, protection of marine environment and biodiversity, and adaptation of coastal areas to climate change impacts.

Research and innovation
ORs have many unique characteristics which place them well in order to pioneer ecosystem management in the face as new threats, and develop research in this area.
Under Regulation establishing 'Horizon 2020 – Framework Programme for Research and Innovation', ORs can obtain funding for priorities such as support for excellent in science, climate change, sustainable transport systems among others.

Biodiversity
The 'Climate action' component of the 2014-2020 LIFE programme will programme activities over three priority areas: 'Climate Change Mitigation', 'Climate change Adaptation' and 'Climate Governance and Information'.

2013 is the third and last year of the BEST Preparatory Action after which the initiatives will have to be supported from other sources. With the view of exploring opportunities for future funding, the IUCN Brussels Regional Office is carrying out a project financed by the BEST Preparatory Action 'Building Partnership and Awareness of Biodiversity and Climate Change in Europe overseas for the Future of BEST' to which all ORs representative should take part. The overarching aim of the project is to strengthen biodiversity conservation and climate change adaptation in Europe overseas by raising their profile and generating support for action, and proposing mechanisms to enhance biodiversity and climate change policies and programmes targeted at Europe overseas.

Energy, transport and communications
The new 'Connecting Europe Facility' (CEF) brings together plans for financing large-scale projects in the fields of transport, energy and communications. The CEF Regulation incorporates a number of provisions for taking climate change considerations into account.

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