Policy Implications for the ESPON Climate Project Vulnerability Assessment

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Abstract
The ESPON Climate project is an Applied Research Project conducted within the ESPON 2013 Programme. The project can be considered as a response to the EU 2007 Territorial Agenda, Priority 5, which stipulates a need for developing Cohesion Policy with respect to territorially differentiated effects of climate change and for further development of transregrional approaches to overcome natural hazards. More explicitly, ESPON Climate also addresses direction given in EU legislation from the EU White Paper "Adapting to climate change: Towards a European framework for action" which states that strategic approaches to spatial planning are needed for territorial development.

In consideration of this policy background, the ESPON Climate project produced a Pan-European vulnerability assessment which identifies regional typologies through analysis of exposure, sensitivity impact and adaptive capacity as components of overall vulnerability. It creates a basis for tailored-made strategies for adaptation due to the regional specificity emphasised within the project. These regional responses to climate change are further addressed within the seven case studies evaluated and communicate the diversity of responses to climatic stimuli. The project provides a territorial focus which is commonly lacking in most related studies. The focus is one which addresses regions within and across European territories rather than maintaining the more commonly used sectoral focus. The project also addresses the need to consider Europe as a whole, to assess what consequences European regions will face in regard to climate change, and how this affects the competitiveness of Europe as a whole and the cohesion of European territories. Through this assessment, ESPON Climate creates an evidence base for policy through possible scenario outcomes. Though the project does not provide a clear cut forecast, it offers a basis for recommendations for policy development toward climate change adaptation.

Concluding findings of the project provide policy recommendations for the development of European regions. The analysis identifies hot spots, or areas most affected by climate change, emphasising the need for developing tailor-made adaptation strategies for example in Southern Europe and for areas such as the Alps and the Mediterranean where tourism will be greatly affected. Also identified are the challenges to spatial planning and which types of regions should be targeted in terms of increasing emission reduction measures. The analysis additionally establishes that countries which are most highly affected have lower adaptive capacity and that this is contradictory to current and future aims of territorial cohesion. These and other findings of the project assist in the understanding and implementation of context appropriate strategies. These strategies will be crucial in overcoming present and future challenges to territorial cohesion and in achieving a harmonization of territorial development.

Acknowledgement

This brief paper is derived from the more extensive literature found within the ESPON Climate Final Scientific Report (2011) and the forthcoming chapter 'Implications for territorial development and challenges for the territorial cohesion of the EC' in *European climate vulnerabilities and adaptation: A spatial planning perspective* (Greiving and Schmidt-Thomé, forthcoming). The reader is encouraged to consult these documents for further information.

1. Introduction to Brief Policy Background

The European Union is currently pressed by many challenges including unemployment, financial crisis, demographic change, movement toward a low-carbon economy and the development of strategies for climate change adaptation. Development and implementation of responses to these challenges necessitates action and initiatives within both vertical (EU, national, and regional levels) and horizontal (across sector) dimensions of governance. This is particularly the case when considering efforts within EU competitiveness and Cohesion Policy which must take into account the spatially differentiated impacts of climate change. Anticipated changes will produce significant economic, social and environmental impact which will vary largely by region, sector, and social groups. Challenges posed by these changes require a place-based approach to actions taken toward implementation of adaptation strategies. This is particularly due to the spatial variation of climatic impacts. With regard to mitigation, the Europe 2020 Strategy adopted by the European Council in 2010 provides specific energy goals toward reducing greenhouse gas emissions and increasing energy security. The Strategy additionally specifies the following priorities (COM, 2010, p. 3):

– Smart growth: developing an economy based on knowledge and innovation.
– Sustainable growth: promoting a more resource efficient, greener and more competitive economy
– Inclusive growth: fostering a high-employment economy delivering social and territorial cohesion

The Strategy also includes a 'Resource efficient Europe' as one of its seven flagship initiatives which, in combination with the above-stated priorities, contributes to both climate change mitigation as well as EU competitiveness. This is achieved through the Strategy's "smart, sustainable and inclusive growth" agenda which aims to reduce emissions and to encourage positive economic growth (COM, 2010, p. 13). The importance of this in relation to EU competitiveness is apparent in the need for reducing energy insecurity and in reflection of pledges already made for emission reductions within the 2009 Copenhagen Accord. However, even if these pledges are met, consequences for competitiveness will still be far-reaching due to the changes already underway. With respect to this fact, actions must be taken now to avoid substantially higher costs of inaction in the future (OECD, 2009). Direction for these actions has been provided within the adoption of the EU White Paper on Adaptation to Climate Change in 2009 which acknowledges the regional vulnerability of climatic impacts and the crucial role of these impacts on the future of European competitiveness. Disparities in regional vulnerability and capacities toward adaptation and mitigation are addressed in both the White Paper and the outputs of the ESPON Climate Project. The disparities highlight how economic development is often correlated with mitigative capacities. This is exemplified by regional differences such as the difference between the lower mitigative capacity and weaker performance in competitiveness indicators of South and East Europe verses that of North Europe. A further example is found within the gradient revealed between East and South Europe which additionally identifies a particular weakness of the peripheral regions compared to that of the core.

The results of the ESPON Climate project reveal that the economic sectors most directly affected include primary as well as the tourism and energy sectors, again with the periphery regions most adversely affected due to their higher vulnerability. These regional imbalances are exceptionally important when considering the impact to European territorial cohesion and are particularly important to future solidarity. Most crucial in this respect is the potential for a widening and deepening of disparities and a compounding of inequalities as a result of climatic impacts.

What these inequalities necessitate is the regular inclusion of climate change policy within rural territorial development as is required under the holistic approach of the Renewed Social Agenda in 2008 (COM, 2008). Inequalities within and beyond rural development will more specifically be affected by the potential change in frequency and intensity of natural hazards including flooding, landslide, forest fire, drought and heat waves which will significantly impact both physical and human capital. The potential loss of physical capital, such as infrastructure, and human capital, such as loss of working days and lives, can produce adverse consequences for EU competitiveness. The ESPON Climate research, however, emphasizes that some climate change impacts produce potential opportunity for capitalization toward reducing these disparities. This is an important part of territorial cohesion and is stressed within the EU's Fifth Cohesion Report (5CR).

The 5CR explicitly addresses the 'third dimension' of Cohesion Policy, territorial cohesion, introduced originally within the Lisbon Treaty (EC, 2010). In contrast to the other economic and social dimensions, territorial cohesion emphasizes the importance of "access to services, sustainable development, functional geographies and territorial analysis" and further states that climate change and energy goals require coordination at all governance levels (EC, 2010, p. 24). This is in order to prevent counteractive policies and additionally places stress on the regional, more local levels. The 5CR addresses these issues and acknowledges differences in intensity of impacts, but does not elaborate on how the variation of impacts will affect future Cohesion Policy. The ESPON Climate project attempts to remedy this gap by identifying regions which are most adversely impacted and should be targeted for financial assistance. Though this project clearly states that it does not provide a clear-cut forecast, it assists in current efforts to improve Cohesion Policy and future growth strategies toward harmonious territorial development.

2. Main Findings of the ESPON Climate Project

The ESPON Climate project conducted a Pan-European vulnerability assessment and evaluated seven case study areas. The assessment focused on five impact dimensions: social, cultural, economic, environmental and physical impact and three elements which determine the regional capacity to adapt: awareness, ability and action. These dimensions serve as an important part of the ESPON Climate methodological framework. Suggestions for policy options are based from the Massey and Bergsma (2008) classification of adaptation objectives: adaptive capacity enhancement, reduction of risk and sensitivity, coping capacity and capitalisation.

The social dimension considers the adversely affected populations exposed to heat waves, flooding, and sea level rise and tends to target adaptation policies to reduce risk such as loss of life. The cultural dimension focuses on susceptible historical sites and landscapes which are exposed to flooding and concentrates on policies toward flood risk reduction especially for the tourism sector. The economic dimension varies by sector with policy recommendations including a need for flexibility, for granting autonomy for business adaptation, and for evaluating opportunities for capitalisation especially in the tourism and agricultural sectors. The environmental impact dimension targets primarily ecosystem indicators with adaptation policies to enhance coping capacity through maintenance of ecosystem services. Adaptation policy for the physical dimension focuses on risk reduction through planning regulations and codes and capacity building of emergency services. Though it is acknowledged that the ability to address adaptation objectives is highly spatially dependent, trends can be observed within these dimensions and are summarised as follows:

- All dimensions need both short and long term adaptation planning
- Adaptive capacity enhancement: is oft a result of early warning systems, education and information sharing

- Risk and sensitivity reduction: requires revision of current and specific policies and regulations
- Coping capacity: is found within focus on response of emergency services
- Capitalisation: is very tourism centred, while few in-practice examples exist

The information provided in the assessment also highlights what can be divided into several categories of the main findings: regional consequences, challenges and typologies in the spatial context, and recommendations for development of climate change strategies[1]. This is followed by a brief section on affects to European competitiveness and cohesion.

2.1 Regional Consequences

This section is broken into three main sub-sections. The first provides the ESPON Climate project's identification of consequences using the INTERREG IV B & C programmes' 10 trans-national regions, while the second sub-section provides consequences as analysed through regional typologies. The third sub-section provides a brief explanation of mitigative typologies.

2.1.1 Consequences on Trans-National Regions Assessment

The ESPON Climate project has generated a regional analysis through identification of climate change issues utilising the 10 European trans-national regions of the INTERREG IV B & C programmes. The analysis identifies a reiteration of the following events throughout the regions: sea level increase, flooding, forest fire, drought, extreme weather conditions and events, and a potential for increased frequency for natural damages. The summary for this analysis is provided in Table 1[2]. The information in Table 1 provides each trans-national region specified by the INTERREG IV B & C programmes and includes the climate change issues identified in each region by the ESPON Climate project as well as recommended options for future programme development.

Table 1. Climate change issues identified by ESPON Climate European for each trans-national region

Region Identified	Climate Change Issues Identified by the ESPON Climate project	Options for further programme development
Northern Periphery	flood sea level rise	-Risk management for settlements potentially affected by river floods related to climate change

[1] The ESPON Climate project employs the definition for adaptation provided by the IPCC Fourth Assessment Report stating adaptation is an "adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities" (Klein et al, 2007, p.750).

[2] Tables within this paper are taken from the forthcoming chapter 'Implications for territorial development and challenges for the territorial cohesion of the EC' in *European climate vulnerabilities and adaptation: A spatial planning perspective* (Greiving and Schmit-Thomé, forthcoming).

Baltic Sea	storm surges sea level rise floods & flash floods changing frost changing precipitation	-Further development of Regional Adaptation Strategies related for climate change impacts on forestry -Climate change impact assessments on coastal and island areas, including tourism and water quality (algae blooming)
North West Europe	flood (river & flash) sea level rise storm surges	-Combination of flood and storm surge prevention and spatial planning as cross border and transnational initiatives.
North Sea	flood (river & flash) sea level rise storms (& surges)	-Combination of flood and storm surge prevention and spatial planning as cross border and transnational initiatives.
Atlantic Coast	flood (river & flash) sea level rise storms (& surges)	-Development of regional strategies to anticipate the impact of river floods -Development of regional strategies to anticipate the impact of storms and storm surges
Alpine Space	floods & flash floods changing precipitation	-Diversification of tourism, also interlinked with water scarcity -Integration of sustainable crossborder adaptation and mitigation concepts -Options of enhancing synergies to avoid conflicts (especially on adaptation measures) -Over regional and transnational water management approaches, especially focusing on the Alps as a "water tower".
Central Europe	floods & flash floods changing frost changing precipitation + summer days + summer temp. sea level rise	-Development of regional climate change adaptation strategies on floods, heat waves, forest fires -Development of regional climate change adaptation strategies on water scarcity -Development of regional climate change adaptation strategies on tourism -Development of regional climate change adaptation strategies for agriculture and forestry
South West Europe	agriculture forestry flood sea level rise	-Development of regional transnational climate change adaptation strategies on heat waves, water shortage and forest fires.
Mediterranean	storm surges droughts floods forest fires changing precipitation + summer days Sea level rise	-Management of public (including tourism) water demand. -Identification of possibilities to save water instead of relying on current -Water management schemes and further development of desalinisation plants. -Avoidance of mal-adaptation, e.g. transferring costs and risks from water sector to energy sector -Management of land take (urban sprawl)
South East Europe	flood sea level rise changing precipitation changing evaporation + summer days Sea level rise	-Emphasize analysis and management concepts on impacts of climate change on forestry and agriculture -Development of common (crossborder) methodology for land use restructuring, including integrated water management planning

Of the INTERREG IV B & C programmes considered, adaptation to combat adverse climatic impacts was not found to be a priority but appeared to be indirectly addressed in the majority of the programmes through efforts toward sustainable development, environmental protection and natural risk avoidance. Actions within these efforts take the form primarily of water management development and risk prevention. Aside from this observation, the ESPON Climate project identifies that when climatic stimuli are applied the most prominent impacts across all regions are found in the following order: flooding, storms, precipitation change and sea level rise.

The results of the vulnerability assessment enable a further classification of these 10 trans-national regions into three major groups which are identified in Table 2.

Table 2. Three major groups identified by the ESPON Climate project vulnerability assessment utilising the INTERREG 10 trans-national regions.

1. Regions where vulnerability is expected, as a rule, to increase at a high or medium rate
Regions: Mediterranean Region, South-Western and South-Eastern Europe **Description:** impacts accrue primarily in the environmental and economic dimension, overall growth of vulnerability related to poor adaptation capacity **Proposed solutions:** program measures addressing e.g. water management, preservation of water, forest fire forecasts, preparation for heat waves and regulation of land use would potentially have the greatest importance
2. Regions where vulnerability is expected, as a rule, to grow at a low rate
Regions: Northern Sea region, the North-Western European and the Atlantic coastal regions (includes also some Alpine regions) **Description:** increase of climate change impacts is projected primarily for the physical and social dimensions **Proposed solutions:** measures addressing natural disasters such as floods and coastal storms would have the greatest positive effects
3. Regions, where vulnerability is expected, as a rule, not to change significantly
Regions: Baltic Sea region, the Northern periphery and Central Europe (the lattermost can also be in part of the second group) **Description:** climate impacts are diverse but not extreme **Proposed solutions:** adaptation measures should stress the importance of the role of water management and prevention of natural disasters

The table (Table 2) identifies the regions in terms of the severity of change in vulnerability as estimated by the ESPON Climate project. The table further provides a description of the climatic impacts and a few recommendations as to potential solutions. What can be concluded from the table is that certain hot spots, or areas most affected by climate change, are found within the Mediterranean region, South-Western and South-Eastern Europe. This is in large part due to the poor capacity for adaptation of the region coupled with significant impacts felt within environmental and economic sectors, especially for the potential impact to the tourism industry. Forecasting, preparation and land use measures are suggested as having the greatest potential benefit in remedying adverse consequences. Climatic change is found to be significant but to a lesser degree within the some Alpine regions, the North Sea, and the North-Western and Atlantic coastal regions. Impacts within these regions tend to

affect primarily physical and social dimensions and are recommended to be addressed through measures that specifically target natural disasters including coastal storms and flooding. The last category consisting of the Baltic Sea region, the Northern periphery and Central Europe faces diverse impacts that are estimated as having no significant changes. In keeping the severity of change to an insignificant level, it is encouraged here to consider adaptation measures stressing natural disaster prevention and the importance of effective water management practices.

2.1.2 Mitigative typologies

With respect to climate change mitigation, the ESPON Climate project has identified what can be described as mitigative typologies[3].Within this identification process, the project makes use of the mitigative capacity definition as provided by the IPCC, "a country's [or region's] ability to reduce anthropogenic greenhouse gas emissions or enhance natural sinks" (IPCC, 2007, p. 818). The analysis of typologies considered social factors including educational commitment and attitude towards climate change as well as the availability and extent of the following: technology for reducing emissions, availability for non-carbon energy sources, land use type, mitigation policies, and government effectiveness and economic resources through income per capita. Four types of regions were produced as a result of the analysis:

1. regions with high capacity and low emissions
2. regions with high capacity and high emissions
3. regions with low capacity and low emissions
4. regions with low capacity and high emissions

The analysis further emphasized the importance of particularly types 2 and 4 as both indicate the most obvious areas in which action toward reduction measures should be taken.

2.2 Challenges and Typologies in the Spatial Context

Aside from the analysis provided above, the project also produces a spatial planning focused analysis generated in terms of identification of spatial typologies and the immediate challenges faced. The project acknowledges and builds off previous work by Massey and Bergsma (2008) as well as Greiving and Fleischhauer (2012) who review European spatial planning perspectives. Through the reviews, it is asserted that spatial planning is related to land use within adaptation policy development and that though its role is growing in importance this role is not well recognized (Greiving and Fleischhauer, 2012). This role is further differentiated based on the planning policies of various countries where, for example, a role is assigned in Germany, France, Hungary, a central role is played in the UK and the Netherlands, and a role is not assigned in Finland and Spain (Greiving and Fleischhauer, 2012). It

[3] The use of the word mitigation follows the definitions provided in IPCC (2007) and Füssel and Klein (2002) where mitigation is an effort to reduce climatic changes by reducing greenhouse gas emissions and through enhancing carbon sinks.

is recognised that consideration of particularly a spatial focus is especially important for adaptation at the regional level not only for political reasons, such as policy with respect to the role played, but also territorially with respect to type of spatial designation. This topic is elaborated within the next sub-section.

2.2.1 Spatial Typologies

The Pan-European vulnerability assessment recognizes and identifies variability of impact not only for specific types of regions, such as those previously mentioned from the INTERREG programmes, but also between and within these regions. This variation is spatially determined and is represented within the ESPON Climate project through regions based on spatial typologies. These are listed as follows: metropolitan/urban, rural, mountain, coastal, sparsely populated, islands, and border regions. The analysis considers the climatic impact, adaptive capacity and vulnerability and provides some policy recommendations within each typology.

The metropolitan/urban regions were found to have high impact particularly for the highly populated coastal areas, Alpine areas and especially Southern Europe. Impact is largely dependent on the characteristics of these regions such as the concentration of both people and infrastructure. The ESPON Climate analysis states that, for these particular regions, there is a need to establish a common 'spatial vision' through collaboration of both spatial planners and civil society because of the management constraints of limited space and resources. The vision must include diversity of structural sensitivities as well as system redundancy (where main elements of the system can be interchangeable) and robustness (where e.g. infrastructure and vegetation strengthen resistance to adverse impacts).

Analysis of rural regions highlights a range of low to high potential impact with particular adversities for Southeast Europe. These regions are economically not as robust as other regions and have consequentially lower adaptive capacity. To remedy this, attention must be paid especially to economic development, particularly for areas facing water scarcity.

Impact is considered medium to high for mountain regions; Southeast Europe, Spain, Greece and the Southern Alps being especially affected. Impacts are exacerbated through the inaccessibility of transport, demographic changes, and triggering of natural hazards by climate change which requires hazard assessment and risk mapping.

Coastal regions have medium to high impact due to potential sea level rise which necessitates a need for Integrated Coastal Zone Management for improving coastal defences in combination with settlement restrictions. Potential capitalisation opportunity exists with potential for increased tourist comfort in Northern Europe.

Sparsely populated regions must be considered in terms of relative and not absolute impact because there are relatively few assets within these regions which include part

of the interior of Spain, Scandinavia and Scotland. Improving accessibility is suggested particularly for the periphery regions.

Islands in the Mediterranean and Atlantic face severe impact due to their reliance on tourism and agricultural sectors combined with low adaptive capacity. Solutions proposed include diversification of economic activities especially those which conserve freshwater resources and are generally less climate sensitive.

A wide range of impacts exist for border regions due to differential sensitivities (e.g. population density, settlement patterns, economic development, and general adaptive capacity). Solutions suggested for these regions include particularly strategies balancing economic development, environmental issues, and demographic change.

Overall, the analysis of spatial typologies reveals that the Mediterranean and Southeast Europe have the highest vulnerability because of high impact and low adaptive capacity, especially those areas in the Mediterranean and the Alps which depend largely on the tourism sector. The typologies identify the vulnerability of these among the other spatially differentiated regions and suggest that each area has a different starting point for the investment and effort needed. Taking the typology analysis into consideration, it must also be acknowledged that challenges exist for the spatial approach to implementing climate change strategies.

2.2.2 Challenges for Spatial Planning

The ESPON Climate project identifies that in taking a spatial approach to adaptation and mitigation one must consider important challenges faced by spatial planning. Already existing structures are a particular challenge especially for adaptation strategies and must be considered within implementation of an RAS, or regional adaptation plan. Spatial planning is considered more relevant for still developing areas because conflicts arise between adaptation enforcement and pre-existing private property rights. To remedy these conflicts, it is recommended to avoid regulatory (or conforming) planning and to provide compensation schemes for affected private property owners.

The role of spatial planning should also be considered as it is and can be applied across sectors and governance levels, though challenges arise in that this role is not well understood, well-developed nor emphasised within strategies toward mitigation and adaptation (Davoudi et al., 2009; Mickwitz et al., 2009; Greiving and Fleischhauer, 2012). There is a need for a multi-level (vertical) and cross-sectoral (horizontal) governance approach because sectors are differently affected by climate change impacts. If the role of spatial planning follows a comprehensive planning approach to climate change strategies, this can consider both institutions within and across different levels and the involvement of multiple actors in order to establish legitimacy of recommended actions and to account for normative values (Mickwitz et al., 2009). The inclusivity of this approach is an important feature of climate change governance and has been cited within both European legislation and recent

literature as essential for effective adaptation strategy development (Ribeiro et al., 2009; Swart et al., 2009; Meister et al., 2009).

2.3 Recommendations for Climate Change Strategies

In addition to the typologies presented and the identification of particular challenges within the spatial context, the ESPON Climate project identifies specific recommendations for adaptation and mitigation strategies. The project recognises and discusses briefly the interconnectivity between the two kinds of strategies. The linkages between these strategies are acknowledged especially by the IPCC Fourth Assessment Report and described within three types of relationships (Klein et al., 2007):

- Direct relationship: involves use of the same resources (e.g. land and stakeholders)
- Indirect relationship: involves connection through budgetary allocations
- Remote relationship: involves distant connection (e.g. currency exchanges)

The project reiterates and recommends the notion that establishing an understanding of the type of relationship is crucial for developing effective mitigation and adaptation, especially in avoidance of potentially counteractive strategies. What must be further understood are the four types of interrelationships also identified by the IPCC, two of which are discussed within the ESPON Climate project: 1) strategies for mitigation which impact adaptation and the inverse 2) strategies for adaptation which impact mitigation. This occurs when, as an example of #1, mitigative reforestation efforts impact adaptation by influencing the water budget and biodiversity of a given region or when, as an example of #2, adaptation efforts require additional energy resources.

2.3.1 Recommendations for Adaptation Strategies

Specific to adaptation strategies, the project recommends more research and development for that which requires international cooperation such as forecasting systems, planning methods and knowledge transfer as well and coping strategies especially for those concerning natural risks (e.g. flooding). Within cooperation for all adaptation strategies is a need to consider multiple levels of governance because implementation at one policy level is not independent of implementation at levels both above and below. It is further recommended to take into account more social measurements including demographic changes and to encourage more concentration on integrated water management particularly when dealing with transnational prevention of flood risks. Specific to tourism and agricultural sectors, special attention should be paid to changes in availability of water as peak water demand and seasonal reduction in supply occur at the same time (Amelung and Moreno, 2009). This is especially important because of the economic role played by tourism in regions such as Mediterranean and the Alps which are even acknowledged in the EU White Paper on Adaptation as susceptible to climate change impacts (COM, 2009). It

is, however, also important to consider what the ESPON Climate project highlights as opportunities, or capitalisation, for these sectors where diversification of both industries can lead to beneficial adaptation strategies. Opportunity for capitalisation is found also within recommendations for mitigation.

2.3.2 Recommendations for Mitigation Strategies

Though substantial difficulties exist in estimating how the energy sector can develop particularly due to uncertainty of estimated impacts, the project recommends encouragement of capitalisation in current and future policy development with respect to mitigation strategies. This is a relatively new concept and takes form in mitigation strategies through opportunities in reduction of energy consumption and increase in energy production. This can additionally mean provision of market opportunities by development of carbon neutral technologies. One more specific example exists in taking advantage of favourable wind power conditions in Northern regions and connecting these to areas of high consumption. Opportunities also exist within the tourism sector, especially within the Alpine region, where development and implementation of climate neutral facilities can be encouraged through mitigation measures.

2.4 Affects to European Competitiveness and Cohesion

The analyses provided by the ESPON Climate project identified the above recommendations and regional typologies based on place-based characteristics of climate change impacts and assists in determining priorities for future territorial development. Identification and variation particularly for regions which are most vulnerable is acknowledged within the 5CR. However, the project provides some solution to the 5CR's lack of further explanation for future policy development. There is a need for a transnationally coordinated approach which must include consideration at the EU level due to nature of climate impacts where boundaries of impact are not confined to politically or administratively drawn lines. Attention at this level is important to ensure efforts are made to build capacities of the most disadvantaged regions. The role of the region is crucial in consequence of the regionally specific physical, social and economic factors which influence the severity of impacts as well as responsibilities of the region in providing utilities, emergency services and general disaster risk management.

Climatic impact to territorial development is likely to deepen already existing regional inequalities and produce a significant challenge to progress for competitiveness and general Cohesion Policy, especially with respect to the solidarity principle with respect to most disadvantaged regions. This demands that more attention be paid to how Cohesion Policy will address this challenge and how this combines with effects of existing demographic changes. The project estimates that this could expand the wealth gap in areas where greater change is expected. Attention is additionally needed for the peripheral regions that face additional challenges due to rising energy costs and substantial commuting. Policy should also

consider what is termed ‘carbon leakage’ where high emitter industries avoid costs imposed by one region by relocating to another. It is suggested that, in order to balance territorial development, climate change issues must be integrated within rural development policy. Another important consideration is the potential development opportunity for regions which rely heavily on seasonally dependent sectors including forestry, agriculture, and especially tourism. These regions face challenges especially at the local level in terms of EU policy implementation.

Through observations from discussion within the 2011 EPSON Internal Seminar, it is revealed that there are some additional challenges to implementing the Europe 2020 Strategy which must be addressed. Discussion greatly emphasized that there exists a need for flexibility in translation of objectives and targets especially at local levels because targets in their current form are unrealistic or undesirable for some regions (e.g. property rights for pre-existing settlement). Further, priorities need to be set at the regional level in order to ensure successful climate change strategy implementation especially with respect to territorial development. According to representatives of the Polish Presidency, this particular Presidency has stressed the importance of the role of spatial planning and the need for spatially specific strategies as well as the need for more local input in strategy development. This sentiment is echoed in the emphasis placed on analysis of the spatial, or place-based, context within the ESPON Climate project and is seen as an important component toward achieving the 2020 Strategy goals and implementation of current Cohesion Policy.

3. Conclusions

A number of observations, estimations and recommendations have been produced as a result of the ESPON Climate project analysis. These products stress that implementation of strategies must encourage regional and more local level involvement and multi-level governance for effective implementation. They further emphasise that the current trends indicated demonstrate a path for European regions which is contradictory to the goals of territorial cohesion and that taking preventative and precautionary actions now save substantial future costs. The analyses and understanding produced from the ESPON Climate and like projects assists in creation of tailor-made strategies which will be crucial in overcoming present and future challenges to territorial cohesion and contributes in the efforts toward harmonious development of the European regions.

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