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ID 1331 | REGIONAL PLANNING RESPONDING TO CLIMATE CHANGE

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ABSTRACT: Climate change, although defined with global and long-term scales, has currently caused substantial impacts to many local places. Even though wide efforts are being made to ameliorate the future environment, increasingly frequent extreme events due to the changing climate have been rather unbearable to many places and population. The integration of mitigation and adaptation efforts becomes a critical issue, so that improvement is available to both current and future, both local and global conditions. Spatial planning for urban regions demonstrates unique potential of promoting this integration. With the review of existing studies, we lead the mitigation-adaptation integration to the topics of regional planning and policy mobilities, for which regional governance is proposed as the appealing innovation in climate governance.

KEYWORDS: Climate change, Mitigation, Adaptation, Regional planning, Policy mobilities

1 INTRODUCTION

Climate change is essentially defined as the potential long-term increase of the global average temperature, which, along with the many associated issues, has gained prodigious international attention and controversy (IPCC, 2014). The social response to climate change is usually conceptualised as either mitigation or adaptation, which has formed a dichotomy (Biesbroek et al., 2009; Bulkeley, 2013). This dichotomy indicates that the two parallel lines of practice addressing climate change have no need to heed each other. However, the implicit (hard-to-recognise, yet sometimes fundamental) conflicts between these two types of efforts may hint total failures of the overall effort (Laukkonen et al., 2009).

Although the different characteristics of mitigation and adaptation would necessitate a certain degree of division, the integration of them is to ensure the total effect, which is the efficacy of our general response to climate change, because, after all, it is climate change that sits at the core where either mitigation or adaptation is born (McEvoy et al., 2006; Wilbanks and Sathaye, 2007). We propose this integration as a specific point to joint climate change concern with spatial planning which is striving to justify its role in addressing climate change (Campbell, 2006; Davoudi et al., 2009). The finding of researching in the literature on spatial planning narrows down to a scale-sensitive conceptual model which embeds mitigation and adaptation in a cross-scale framework (Howard, 2009). The key potential of integrating mitigation and adaptation is to take into account a full range of spatial scales. This conceptual model suggests a mode of mitigation-oriented adaptation as the most desirable integration of mitigation and adaptation, which would also be the most effective response to climate change. Moreover, compact urban form and green open space are recognised as important elements constituting the spatial planning approach towards mitigation-oriented adaptation, for which we propose further research on regional planning. At last, policy mobilities is briefly reviewed to demonstrate its relevance and competence in searching for effective form of regional planning responding to climate change. The expectant contribution is not only an advocacy of planning in the multi-disciplinary context, but also a proposal of some very effective tactics. The following three sections before conclusion will thus unfold the dichotomy between mitigation and adaptation, a scale-sensitive model integrating mitigation and adaptation, and policy mobilities.

2 THE DICHOTOMY: MITIGATION AND ADAPTATION

The dichotomy between mitigation and adaptation has been observed in policies concerning climate change, which means mitigation and adaptation are traditionally and perhaps still often conceived of as two fundamentally different strategies of responding to climate change (Cohen et al., 1998; Wilbanks and Sathaye, 2007). Mitigation means to prevent or decelerate the increase of global mean temperature, while adaptation means to accept and live with the environmental conditions under the warmer climate. Since climate change is considered largely caused by the human-induced emission of greenhouse gases, mitigation aims at reducing this emissionby limiting anthropogenic causes. In contrast, adaptation focuses more on the consequences of climate change than the causes. For example, more frequent extreme precipitation, heat waves and rising sea level (Bulkeley, 2013).

For a long time, mitigation has dominated the political discourse which thus overlooked adaptation (Schipper, 2006; Klein et al., 2007). The quantitative features of mitigation match very well with the evidence-based policy making and international negotiation (Biesbroek et al., 2009). However, mitigation is a long-term strategy whose time lapse between actions and impacts is large (McEvoy et al., 2006). Moreover, the issues of environmental justice and international competition that complicate the global negotiation generate more difficulties in implementing mitigation programmes (Bulkeley, 2013). Even though current mitigation effort successfully proceeds, the extent of the climate change consequences will continue to intensify in the short-term future, which would very likely exceed the response capacity of many countries and cities (e.g. comparing Bangladesh to the Netherlands regarding flooding, and Bangkok to London regarding heat waves). Therefore, adaptation gains budding attention for complementing mitigation to form a more comprehensive response to climate change (Wilson and Piper, 2010). Adaptation is relatively (compared to mitigation) short-term and highly case-specific, because, for instance, major issues facing coastal cities are disparate from those for inland areas (e.g. flooding and drought, both of which prove to be the consequences of climate change, Bulkeley, 2013). These issues fluctuate frequently over time along with different kinds of extreme weather events which affect the cognitive intensity of associated risks (Matthews, 2014). Therefore, adaptation often becomes concrete only at the local scale where particularities are taken into account, which causes great challenges for making adaptation policies concerning wider geographical area. In practice, adaptation strategies tend to match the local scale, while decision-making regarding mitigation often takes place at the national level (Wilbanks and Sathaye, 2007).

The dichotomy between mitigation and adaptation conceptualises the fact that mitigation and adaptation are understood and practiced largely separately (Cohen et al., 1998; Howard, 2009). Because mitigation and adaptation are different in many respects including chief goals, evidence bases, temporal and spatial scales, some policies only consider mitigation while some others only adaptation (Swart and Raes, 2007; Biesbroek et al., 2009). However, mitigation and adaptation are complementary to each other in forming the overall response to climate change (Wilbanks and Sathaye, 2007; Howard, 2009). The dichotomy of them may detract from the efficacy of either, which may further lead to failures of the overall response (Biesbroek et al., 2009). The danger of this dichotomy is firstly the potential of indicating substitution between them. Adaptation maybe used by some parties to avoid taking mitigation responsibilities, since mitigation often means to compromise on economic growth. Similarly, mitigation may be taken as the excuse of making no adapting plans. Secondly, the lack of informative integrating analyses of mitigation and adaptation would foment conflicts between them. One approach could be adaptive at one scale while generating negative impact to mitigation at another scale. For example, in the cities hit by frequent heat waves (e.g. cases from Latin America, Pizarro, 2009), installing air conditioners and increasing distance among buildings would be helpful to decrease the temperature, for which supporting air conditioning and encouraging urban extension could be the adaptive strategies adopted by the local government. However, these adaptive actions will certainly increase emission and eventually increase the heat level at the global and long-term scales, which is undermining to mitigation (also termed mal-adaptation as simply transferring adverse impacts to other time, places or policy sectors, Wilson and Piper, 2010). Therefore, research for synergy is called for to prevent the efforts at one end of the dichotomy from cancelling the efforts at the other.

Studies with an economics perspective offer cost-efficient analysis to integrate mitigation and adaptation (Wilbanks, 2005; Goklany, 2007; Wilbanks et al., 2007). The cost-benefit analysis calculating the cost and benefit of both mitigation and adaptation approaches helps policy-makers to divide fiscal resources between them (Dowlatabadi, 2007; Klein et al., 2007). For example, the adaptation strategy of building

dikes bears the cost of constructing the dikes and generates benefit through the value of the protected land (Tol, 2007). At the same time, the cost spent on mitigation programmes (e.g. energy research) may reduce the cost for adaptation, in this case through lowering the construction cost of building dikes, because the slower rate of sea level rise due to mitigation would require a lower height of the dikes. Concerning the above scenarios, modelling with more sophisticated details would be able to inform policy makers whether a proportion of fiscal resources should be used for mitigation or adaptation, through which decision-making for mitigation and adaptation is integrated (Tol, 2007). Compared to the dichotomist view which suggests the competition between mitigation and adaptation over resources, the cost-benefit integrating model demonstrates why these two could actually share the cost and collectively make better use of the resources. The central merit of this cost-benefit integration of mitigation and adaptation is to make the overall response to climate change the most cost-efficient. However, cost-efficiency may be only one of the desirable scenarios. Moreover, the quantification of mitigation and adaptation may imply that one could be the substitute of the other, which is more about trade-offs than integration (Tol, 2005). Modelling provides calculating tools to measure the integration of mitigation and adaptation, which must be based on an integrating framework that informs the model what factors need to be included. Modelling itself as one way of expressing the integration would require the integration to have been done through an integrating framework beforehand. Such a framework varies greatly across cases among many of which substantial research is still needed before it is ready for quantification. Risk governance is proposed to integrate mitigation and adaptation into the concept of response capacity (Grothmann and Patt, 2005). Mitigation endeavours to reduce the risks of possible adverse impacts, and adaptation builds the capacity with which the impacts would be coped (Jones et al., 2007). For this reason, managing risks and developing capacities would resolve the dichotomy between mitigation and adaptation. Compared to the focus on the inter-relationships between mitigation and adaptation, some alternative proposals argue that trade-offs between investing technological innovation and encouraging social response are more pertinent (Tompkins and Adger, 2005). This suggests policy makers to think about how much to invest technology innovation (e.g. clean energy vehicles) and how much to invest social behaviours (e.g. campaigning for public transiting over driving private cars), rather than how much on mitigation and how much on adaptation. Resilience building proves to be suitable for the current situation which is replete with uncertainties (Saavedra and Budd, 2009). Risk governance transfers the focus on the future (mitigation) into the focus on the current capacity building, the latter of which is more concrete and thus more attractive to local communities (Laukkonen et al., 2009). For policy makers, however, there have been several other dichotomies, for instance, mitigation-adaptation, innovation-behaviour, long and short term, and public-private, one of which could not solve the others. For example, technology innovation could still be divided into mitigation ones (e.g. energy-efficient light bulbs) and adaptation ones (e.g. smart ventilation schemes). The struggle between mitigation and adaptation still exists and may come forward sooner or later.

Sustainable development is taken as another framework to integrate mitigation and adaptation, which warns the discussion between mitigation and adaptation of the potential of overlooking the ultimate goal that both of them are after. For instance, in the cases where air quality is harmed by the emission of polluting gases many of which are also counted as greenhouse gases, a common goal of adaptation (improving air quality) and mitigation (reducing emission) is to protect public health from respiratory disorders (Dowlatabadi, 2007). The focus on the dichotomy between mitigation and adaptation may preclude policy makers from realising that their mitigation policies, which are supposed to aim at sustainability in the long run, actually end up with unsustainable situations (Urwin and Jordan, 2008). The list of the gases harmful for health is different from the list of greenhouse gases, for which policies limiting greenhouse gases emission (e.g. taxing tailpipe emission of cars) may increase the alternative sources that emit less greenhouse gases but more harmful gases (e.g. switching from gasoline cars to diesel cars) (Dowlatabadi, 2007). Therefore, to prevent mitigation policies from disturbing adaptation, or to prevent the enthusiasm for climate change response from harming the quality of environment, the prerequisite is to clearly set sustainable development as the ultimate goal of both mitigation and adaptation (Katarina and Ulrika, 2009). Sustainable development becomes the common criteria to scrutinise mitigation and adaptation policies. The critique to this approach lies in the contentious discussion about sustainability itself. Compared to the author who cherishes the quality of environment at any time (both the future and the current), some author may argue that a certain extent of compromise on the current condition is for the long-term betterment (Dowlatabadi, 2007; Howard, 2009). It is difficult to decide whether a harmful environment now or an even more harmful environment in the future is more unsustainable. In these cases, the integration of mitigation and adaptation still depends on the debatable topic about what integration is considered desirable. In summary of this section, the problematic dichotomy between mitigation and adaptation is difficult to eliminate. The complexity of climate change issues requests

response in various forms and at various levels, which underlies the conceptualisation of mitigation and adaptation that have helped policy makers understand and manage collective actions. However, like a two-edged sword, the separation of mitigation and adaptation efforts may generate redundant cost or significant conflicts. Much research is striving to offer useful frameworks for the integration, although the difficulty of this has not been completely overcome. Therefore, the exploration of the integration of mitigation and adaptation remains a critical research question. The next section will unfold how spatial planning research has prepared for further study on this question.

3 A SPATIAL PERSPECTIVE: REGIONAL PLANNING

Spatial planning policies concern the impact of oft-anthropogenic spatial arrangements as well as the spatial impact resulted from other kinds of natural processes and human activities. For example, planning cities in compact forms may reduce the greenhouse gases emission by limiting the total amount of cmmuting traffic (McEvoy et al., 2006; Hamin & Gurran, 2009; Pizarro, 2009). Moreover, transformation of the current form of built environment is urged by the need of spatial adaptation to the risks of sea level rise and increasing extreme precipitation (e.g. programmes about “space for water”) (Davoudi et al., 2009). Furthermore, modern economy continues to encourage population to spatially concentrate at climate-risky locations (e.g. large coastal cities encountering sea level rise) (Bulkeley, 2013). Altogether, planning is interested in the spatial dimension that is seen in many issues and cases, including climate change. Some evidence proves that spatial planning plays a significant role in addressing climate change, for example, compact urban form as mentioned above (Davoudi et al., 2009; Hunt & Watkiss, 2011). However, there also exist doubts about whether spatial planning is thoroughly entitled to deal with climate change, especially considering the predominance of natural science (e.g. meteorology) in climate research (Campbell, 2006). What‟s more, there also exists suspicion that climate change is rather a political invention than scientific fact. Against this background, spatial planning policies have to articulate the very contribution of their own in addressing climate change, through which planning approaches solicit political and public support (Wilson, 2006a; 2006b). Spatial planning is keen on managing spatial scales, which are recognised as a key of the integration of mitigation and adaptation (Howard, 2009). The multiplicity of impacts depending on spatial and temporal scales results in the transformation of mitigation and adaptation across scales (i.e. mitigation at one scale simultaneously becomes adaptation at another scale). Therefore, actions should be contemplated in several, instead of single, spatial scales including global, national, regional and local, as well as temporal scales including short, medium and long terms. Conceptual models embedding climate change response into scale-sensitive frameworks provide opportunities for this scale-concerned integration of mitigation and adaptation (Howard, 2009). Howard (2009) offers an integrating conceptualisation whose essential key is the concern on the multiplicity of spatial scales. For example, air conditioning is a local adaptive tactic for the places that are hit by high temperature, but its cost of energy and its emission transform this local adaptation into an action hindering mitigation at the global scale. Another example is urban extension. Encouraging people to live in the sub-urban areas could be an adaptive strategy that may solve the problems of urban heat island and air pollution in the local city centres, but urban sprawl which would generate more emission from transportation also hinders mitigation at the global level.

Howard (2009) developed the diagrame shown in Figure 1 to demonstrate the conceptualisation of the inter-relationshipsbetween mitigation and adaptation. The efforts helpful for both mitigation and adaptation fit in the area of A. In the area of D and E, approaches are helpful for one but problematic for the other. Moreover, in the area of B and C, approaches are supportive to one and neutral to the other. The two examples mentioned above (air conditioning and urban extension) belong to the area of E. Planting more trees in the urban regions is an example for the area A, because trees and green parks can absorb emission, function as temporary floodplain, adjust temparature, as well as improve the quality of local environment. Renewable energy research which mainly aims at mitigation with little immediate impact on adaptation could fit in the area B. For the cases where the shortage of water supply is recognised as a climate change issue, harvesting rainwater could be taken as a tactic adapting to the drier micro-climate although it has few impact on the overall climate, which matches the area C. Finally in the area D, compact urban form, as opposed to urban sprawl, could be an example of compromising on the local environment for the purpose of global mitigation. Some of the examples here will be discussed again in more details later.

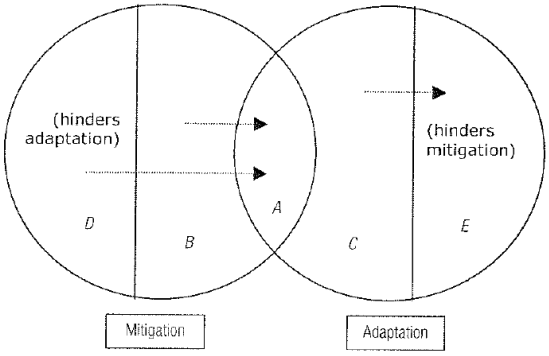

Figure 1. Conceptualisation of the inter-relationship between mitigation and adaptation (source: Howard, 2009)

So far this conceptual model resembles some other authors‟ matrices categorising the relationships between mitigation and adaptation (Klein et al., 2007; Wilson and Piper, 2010). These matrices offer four categories including approaches focusing on mitigation while having impact on adaptation, approaches focusing on adaptation while having impact on mitigation, approaches concerning the trade-offs between mitigation and adaptation, and approaches aiming at a win-win situation. Table 1 presents a brief summary of the examples offered by these matrices.

Inter-relationships	Examples
Win-win (Mitigation and adaptation are mutually enhanced.)	Planning for suitable urban form (reducing emission and supporting livelihood) Offshore wind energy farms (providing clean energy with little compromising on other land use, compared to hydro power) Bio-energy crops (providing clean energy and enhancing rural economy) Urban agriculture and local food markets (reducing energy consumption and supporting well-being)
Trade-off (An optimal balance between mitigation and adaptation is to be identified.)	Dikes and surge-barriers (adaptive infrastructure which causes emission and requires energy to operate) Hydro power plants (providing clean energy but may impede emission reduction by permanently inundating large areas of forests) Roads connection to promote rural economy (adaptive infrastructure which causes emission)
Mitigation-centric	Tax on vehicle tailpipe emission Hybrid or complete electric vehicles

Table 1 Categorising inter-relationships between mitigation and adaptation
(source: adapted from Klein et al., 2007; Wilson & Pieper, 2010)

Connecting the resource-competing relationship between mitigation and adaptation, any approach of one kind would have at least some cost (negative impact) to the other, since resources being spent on either would mean less resources available for the other. Therefore, it becomes more difficult to evaluate the inter-relationships which would require some exact cost-benefit calculation. Moreover, it becomes thus more difficult to find a truly neutral relationship in which the cost happens to evenly equate the benefit. For this reason, in the qualitative domain, Howard (2009) assumes that adaptive approaches would to a larger or smaller degree hinder mitigation (completing for limited resources), if they have no obviously significant facilitation to mitigation. Furthermore, he considers the mitigation approaches always fundamentally beneficial to adaptation in larger spatial and longer time scales, because any mitigation approach as stabilising changes would make the future situation easier for adaptation. Therefore, back to the diagram in Figure 1, Howard (2009) proposes the trends of approaches in the areas of B and D moving towards A, and those in C moving towards E. The first trend represents the conceptualisation that all the mitigation approaches would ultimately enhance both mitigation and adaptation. The second trend argues against those adaptive tactics which have inadequate concern on mitigation, for which reason short-term passive adaptation mismatches the long-term holistic considerations of climate change response. The essential conclusion of Howard (2009) is two-fold. Firstly, mitigation is a primary form of adaptation. Mitigation is

fundamentally adaptive, in the long run if not immediately, for which mitigation strategies could be treated as adaptation strategies. Secondly, mitigation strategies without significant benefit to adaptation are better than adaptation strategies without significant benefit to mitigation. Any local actions should bear in mind that climate change is essentially a global issue, so avoiding the global responsibility (e.g. free-riding or mal-adaptation) is impeding the long-term progress. Therefore, the integration of mitigation and adaptation in this model is to promote mitigation-oriented adaptation. Even though these mitigation-oriented adaptation tactics might be more expensive, complex or culturally inconvenient than the straightforward approaches, they are worth investment (Howard, 2009).

Among the many examples considered by the integrating conceptualisation, compact urban form (or compact cities) is intensively concerned by spatial planning. Within the planning field, compact city was campaigned for the stabilisation of climate and sustainability, but this strategy has become controversial regarding its two-edged characteristics (Pizarro, 2009). A compact urban form endorses the high concentration of sites, buildings and population, urban fabric with small blocks and many intersections, and the mixed-use of space, so that people have less needs of moving by private cars (Hamin and Gurran, 2009). The high density of population that intensifies mobility needs would support mass-transit system which is at least energy-efficient if not emission-free (Pizarro, 2009). This becomes the most obvious strength of compact cities regarding climate change mitigation, since modern transportation is recognised as one of the most significant sources of emission. Moreover, mixing spatial functions which may encourage social interactions is conceived of positive to social and economic sustainability. However, the very compact forms of many cities also generate problems to climate change. First of all, the compact (i.e. crowded) environment may intensify air pollution and thus public health problems, even if the total amount of emission is reduced (Howard, 2009). Secondly, in the cities with hot-humid summers, a compact form underling the urban heat island effect may encourage air conditioning which then probably cancel the reduction of emission from transportation (Pizarro, 2009). Thirdly, the high density of built environment is likely to sacrifice permeable surfaces, which increases the chance of flooding due to storms (Hamin and Gurran, 2009). Moreover, some case study considers the proximity of sites a risk of exacerbating unfortunate accidents (e.g. explosion and fire, De Roo, 2003).

Bearing the paradoxical issue of urban form in mind, a related planning concern is green open space. More space for planting trees is suggested by many urban planning scholars as a win-win solution contributing to both mitigation and adaptation (Hamin and Gurran, 2009; Howard, 2009). Green space (and ideally forest) can serve as a carbon sink area (Klein et al., 2007; Ravindranath, 2007). Green parks provide natural surfaces to absorb storm water (Stone, 2005). Photosynthesis of plants consume solar heat (Nyong et al., 2007). Open space is helpful for wind circulation which may cool the environment and improve air quality at the same time. In a word, green space seems a key to solve the many problems associated with the compact urban form, but it also seems to add another paradox: planning more green (open) space means a less compact urban form. As a result, Hamin and Gurran (2009) conclude that the most effective form contains a moderate density with adequate green infrastructure. Pizarro (2009) concludes with a multi-angular framework assessing a suitable urban form for a particular case. Moreover, McEvoy et al. (2006) suggest developing regional parks near urban areas as one alternative to increase the proportion of green space in urban regions. The suggestions above about compact cities and green space could be connected to the studies about green infrastructure, eco-cities, and urban ecology, over which what we observe as an overarching issue is the potential advantages of spatial planning at the regional scale. Regional planning has the potential to internalise the paradox between compact urban form and green open space, through which the advantages of both could be delivered. Planning urban regions with the regard to this concern would set up significant spatial foundation of the integration of mitigation and adaptation, and provide fundamental bases for mitigation-oriented adaptive urban societies. While spatial planning is striving to justify its role in addressing climate change, the potential of regional planning in integrating climate change mitigation and adaptation is considered a relevant answer and promising proposal. This section argues about how the call for the integration of mitigation and adaptation leads to the proposal of regional planning. The next section will further introduce policy mobilities as the channel to explore the insights in both practice and research.

4 GOVERNANCE INNOVATION: POLICY MOBILITIES

The integration of climate change mitigation and adaptation becomes a window to deepen the understanding of cross-scale effect, especially between the regional and global. Research on multi-level

governance and supranational networks suggest a way of cross-scale transformation that is beyond the vertical summing-up mode assisted by the hierarchical administrative systems. We consider international policy mobilities one of these channels through which the efforts of climate change mitigation and adaptation are interwoven and transformed through scales. Policy mobilities conceptualises the processes and outcomes associated with the fact that policies for shared issues at various places the world over become increasingly convergent (Temenos and McCann, 2013). The increase of policy mobilities is significantly supported by the extensive flow of information and intensive networks of agents at the current age (McCann and Ward, 2011). Compared to policy mobilities, a highly related concept is policy transfer (Benson and Jordan, 2011; McCann and Ward, 2011; 2013; Marsh and Evans, 2012). Research on policy transfer has focused on transfer-agents and the role of nation states, which matched the situation decades ago when most transfer relations were at the nation scale and the transfer relied heavily on particular agents including both individuals and institutions. At that time, power relation was the backbone issue which was why policy transfer was firstly concerned in political studies. Geographers argued later that geography should be taken into account as time had changed (McCann and Ward, 2013), and researchers in political science also acknowledged that the concept of policy transfer was rather evolving than static (Marsh and Evans, 2012). Both the conceptualisation of transfer and mobilities concern the movement of policies, but the literature about policy mobilities conspicuously intends to bring in new meanings that more accurately match the reality of the current age.

The concern from geography raises the awareness that understanding of policy transfer should go beyond the nation-centred view (Benson and Jordan, 2011; McCann and Ward, 2013). There have been more cases where policy mobilities is inter-urban, and many more actors and venues are involved, which is why some authors deliberately pluralised the word mobility to connote the multiplicity of processes and outcomes involved (Temenos and McCann, 2013; Stone, 2004; Cook and Ward, 2011). Moreover, policy mobilities also has influential impacts on the construction of geographical scales and the assemblage of cities and regions (Allen and Cochrane, 2007; Anderson and McFarlane, 2011). Study on policy mobilities matters not only for the policies and their movement, but also for the physical outcomes of how global geography is drawn and how local places are shaped. Moreover, urban regions are privileged sites of innovation, for which research appeals analyses about the inter-scalar conditioning of governance and policy (Temenos and McCann, 2013). In fact, the popularity of many policy models is based on the popularity of particular cities and the successful implementation of the policy models there (Ward, 2006). Global cities have gained more attention and thus attract more research (McCann, 2004). On the other way, policy mobilities helps cities for their ambition of becoming global. Policy innovation in previous research was conceptualised similarly as policy mobilities (Graham et al., 2013; Berry and Berry, 2007). Policy innovation is distinguished from policy invention while referring to the meaning of „new" (Berry and Berry, 2007). Policy innovation in literature refers to the adoption of such a government programme which is new to the government adopting it. In contrast, policy invention as the process through which original policy ideas are conceived is much less studied than innovation as adopting policies having existed or implemented somewhere else (Berry and Berry, 2007). Therefore, policy innovation and policy mobilities to a large degree mirror each other. Although a policy may not be entirely new, the adoption of it may be very new to a particular place. Policies are context and geography sensitive, for which adopting a policy from some other context or place can be quite innovative and result in „new" impacts at the place where it is adopted. Therefore, policy mobilities become the way of innovation by policy-makers who introduce some strategy feels new and may even disrupt the previous condition of a particular place.

5 CONCLUSIONS

The social response to climate change is seen in the dichotomy between mitigation and adaptation, for which there may be conflicts between them impeding the overall efforts of intervening in climate change. The integration of mitigation and adaptation is calling for comprehensive consideration on the multiplicity of scales. Spatial planning approaches can fit in the conceptual model where mitigation and adaptation are well integrated over multiple scales. Compact urban form has the ability to mitigate emission, although it may be unsuitable for adaptation for some geographical areas. Green open space is then suggested to complement the approach of compact cities so as to make progress towards both mitigation and adaptation. The conclusion of this literature study is to propose further research on regional study to demonstrate the role played by spatial planning in dealing with climate change. Moreover, policy mobilities matches the methodological concern on inter-scalar impacts of geography and spatial forms. The transfer

of policy knowledge is also considered useful for governance innovation which is appreciated as a key of successful climate response.

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