Technopolitical Mediations in the Climate Change Regime: STS Takes on Hot Air

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Abstract

Based on the premise that the emerging transterritorial environment networks are restructuring the forms and scales of politics and governance, this article explores the multivalent terrains of technical mediation in transterritorial networks as the locations of exercise and appropriation of power, citing the case of climate change. The article identifies three layers of mutually complementary or exclusive analytical directions of these multivalent terrains that structure the mediations, namely, the different standpoints on the scientific understanding of climate change; how the techno-scientific understanding of the UNFCCC and the IPCC are approached; and on the effectiveness of the Kyoto mechanisms in representing different actors and interests at different scalar levels. The article looks into the potential mediations at different levels of knowledge claims and scientific expertise, operational and regulatory mechanisms, framing of problems and definitions, and field exposure across these terrains.

Introduction

The emerging transterritorial environment networks are restructuring the forms and scales of politics and governance globally. These networks, by their very nature, are technically mediated in their formation and functioning. This marks the increasing *technification of politics* that draws legitimacy from the institutionalization of scientific expertise and forms of knowledge, by formulating tools and constructing common standards in instruments and practices on a transterritorial scale. The climate change regime formed around the United Nations Framework Convention on Climate Change (UNFCCC) is among the prominent transterritorial environmental networks that are altering the politics of scale and governance through institutional and regulatory arrangements. While this article is sensitive about the scalar configurations, its emphasis is rather on an

overview of the multivalent terrains of technical mediation in transterritorial networks as the locations of exercise and appropriation of power, citing the case of climate change.

The article first delves into the background, deals with the origin and functioning of the climate change regime to orient the reader to the operational mechanism of the regime. The second section of the article looks into the climate change regime as a transterritorial network. Along with the issues related to the reconfiguration of boundary, scales etc., this part also maps the broader contours of different layers in the mutually complimentary or exclusive analytical directions of climate change discourses. In the backdrops of the above two sections, the third part problematizes the climate change regime in order to find the multivalent terrains of operation where choices of different kinds are made to negotiate the techno-social functions of the regime. The article argues that, instead of viewing the climate change regime as a static monolithic techno-scientific mechanism, we should rather address it as a terrain of multivalent mediations at various levels such as knowledge claims, framing and defining of issues and objectives, institutional arrangements etc.

Climate change regime: Background and origin

From the late 1970s onwards efforts have been made internationally to mitigate global warming, a process wherein excessive presence of greenhouse gases (GHGs) in the atmosphere results in progressively increasing temperature on Earth, which is considered to have detrimental implications for the environment (and life). The World Meteorological Organization (WMO) organized its first World Climate Conference in Geneva in 1979 and expressed its concern over anthropogenic 'regional and *even global changes*' of climate (emphasis added). The study published by the US National Academy of Sciences' (NAS) Ad Hoc Study Group on Carbon Dioxide and Climate in 1979 and its assessment report entitled 'Changing Climate' in 1983 had an international impact on policy initiatives. Another significant development that followed was the international 'Conference on the Assessment of the Role of Carbon Dioxide

and of Other Greenhouse Gases in Climate Variation and Associated Impacts' in Villach (Austria) in 1985. Sponsored by the United Nations Environmental Programme (UNEP), the World Meteorological Organization (WMO) and the International Council of Scientific Unions (ICSU), it brought together 89 scientists from 23 countries across the world to form an international panel interfacing science and policy. To pursue the recommendations of the Villach conference, follow-up studies and conferences were held, and the Toronto conference in 1988, known as the 'World Conference on the Changing Atmosphere: Implications for Global Security' marked the beginning of high level political debate on the risks of anthropogenic climate change (van der Sluijs et al. 1998). It recommended a 20% reduction in worldwide CO_2 emissions by 2005 (from a 1988 benchmark). Simultaneously, independent of the Toronto Conference, the WMO established an Intergovernmental Panel on Climate Change (IPCC) with the support of UNEP in 1988 to assess the scientific, technical and socio-economic aspects of anthropogenic climate change. In 1990, the scientific Working Group of IPCC brought out a comprehensive report that was accepted by the second World Climate Conference in Geneva, in the same year, as a vital scientific basis for international negotiations on climate change.

UNFCCC

The said efforts culminated in the conception of the United Nations Framework Convention on Climate Change (UNFCCC), which was adopted in 1992 in Rio de Janeiro and entered into force in 1994. This remains one of the most widely supported international environmental agreements with 192 countries are party to it at present. The decision making body of the UNFCCC is the Conference of Parties (CoP), which meets annually. The major agreement reached at the third CoP in Kyoto in 1997, known as the *Kyoto Protocol*, came into force in February 2005. The Kyoto Protocol forms the legal basis of international climate change mitigation policies and programmes under the broader UNFCCC framework and stipulates the mechanisms of regulation to operationalize the GHG[1] abatement process through specific commitments and other func-

tional requirements. The mechanism that is intended to stabilize the GHG concentration in the atmosphere to prevent detrimental anthropogenic interventions in the climate, has identified that the industrially advanced countries (termed as the Annex 1 countries in the parlance of the Protocol) bear the historical responsibility for the present state of excess concentration and consequently devised legally binding commitments for these countries. These commitments are in the form of stipulated permitted levels of emission in a given period of time. While the countries with commitments to limit or reduce GHG emissions are directed to meet their targets mainly through national measures, the Protocol has created three market based mechanisms as additional means to deal with the targets transterritorially, primarily to attain these targets 'cost-effectively'. In turn, it is through these mechanisms that the climate change regime mainly operationalizes the functional requirements of mitigation in a major way. These mechanisms constitute what has been referred as the 'carbon market', which has evolved into the key tool for reducing emissions worldwide with transacting units worth 30 billion USD in 2006. The climate change regime envisages that these mechanisms, particularly Clean Development Mechanisms (CDM), also foster sustainable development through technology transfer and investment, help countries with Kyoto commitments to meet their targets by reducing emissions or removing carbon from the atmosphere in other countries in a cost-effective way and encourage the private sector and developing countries to contribute to emission reduction efforts.

'Flexible Mechanisms'

The three market based instruments devised by the Kyoto Protocol, referred to as the 'Flexible Mechanisms', aim at reducing GHG emissions and are applied globally, defined on the basis of the geographical location of the parties, to engage in collaborative actions resulting in emission reduction as defined by the scientific and policy norms of the Protocol. By fusing the scientific understanding that the GHG emissions or the reduction of emissions anywhere on Earth affect the atmosphere uniformly and the economic rationale of different operational costs across

the different parts of the globe, the climate change regime constructed a tradable commodity in the form of emission reductions or removals so that the different actors in the regime could transact particular values of emission 'currencies' across the market mechanism the regime has created. These units, over the 2008–2012 commitment period, are expressed as levels of allowed emissions, or 'assigned amounts', which are calculated in terms of tonnes of CO_2-equivalent emissions. In the process, the regime has created countries with different levels of inclusion in the market operations although they are integrated into the regime on the basis of similar underlying interests.

Among the flexible mechanisms, *Emissions Trading (ET)* is an instrument between the parties with commitments of accepted targets for limiting or reducing emissions under the Kyoto Protocol (called the Annex B parties in the Protocol) over the 2008–2012 commitment period. Under Article 17 of the Kyoto Protocol, the countries that have emission units to spare—emissions permitted them but not 'used', which means the party's quantity of emissions is below the permitted levels of emission—can sell this excess capacity to countries that are over their targets. The allowed emissions are divided into 'assigned amount units' (AAUs), which is the unit of transaction.

Joint Implementation (JI) is a project-based mechanism directly linked to the 'carbon market' that enables industrialized countries to carry out joint implementation projects with other developed countries. The JI traces its origin back to the 1992 UNFCC Convention, Article 4.2a, which states that the Annex I countries (the list of industrially advanced countries that include 24 original OECD countries, the European Community and 11 countries undergoing the process of transition to a market economy) may 'implement such policies and measures jointly with other Parties and may assist other Parties in contributing to the achievement of the objective of the Convention'. JI is based on discrete emission reduction units that could be credited to an investor country for reduction projects realized in a host country. Reduction credits would be based on actual, project-based avoidance, reduction, or sequestration of GHGs. JI projects make it easier for industrialized countries to meet their targeted reduction of GHGs by widening the options of more eco-

nomical or cost-effective mitigation measures. The unit of transaction in JI projects is called ERU, with one tonne of CO_2-equivalent emission reduction by a JI project generating one emission reduction unit (ERU).

Third among the 'flexible mechanisms' of the Kyoto Protocol for emission reduction, the *Clean Development Mechanism (CDM)* forms a transterritorial instrument between the developed and the developing countries. Like the JI, the CDM is also a project-based mechanism involving investment projects that reduce emissions in developing countries. The CDM is intended to make the greenhouse gases abatement process economically easier for the developed countries, while simultaneously assisting the developing countries in setting up a sustainable development trajectory. With the emission targets of the first commitment period (2008–2012) set and with different institutional and operational mechanisms in place, a large number of CDM projects[2] have already begun to generate 'Certified Emission Reductions' (CERs)—the exchange unit of CDM projects specified in the Protocol—and are being transferred across territories.

As the above sections suggest, the climate change regime can be viewed in summary as a technopolitical mechanism that emerged in the late 1970s on the basis of the scientific understanding that the excessive presence of certain identified gases (categorized as GHGs) in the atmosphere contributes towards the volatile climatic variations on Earth with detrimental implications for life forms. The reason for the excessive presence of GHGs has been identified as anthropogenic, particularly attributed to the fossil fuel driven industrial activities that commenced with the Industrial Revolution in the West. Within a score of years from its initial findings, there were numbers of scientific follow-up studies that also focused on the varied impacts of these environmental changes on life forms as well as exploring the options for mitigating and adapting to anthropogenic climate change. In the process, the mechanism has devised forms of creating, organizing and codifying knowledge, institutionalized the network of different actors, codified the levels and patterns of interrelations, established tools and instruments to quantify different parameters and formed institutions to operationalize the process. For the broader academic understanding and contextualizing of the processes

involved, the climate change regime can be understood as a transterritorial network that functions within defined parameters with regard to knowledge claims, institutional arrangements and functional practices.

Climate change regime as a transterritorial network

It has been widely observed that the emerging economic and environmental arrangements are significantly altering the operational boundaries of geographical scale with different forms of power negotiations as different globalizing projects are being increasingly studied from various standpoints and disciplinary orientations (Bulkeley 2005; Swyngedouw 2004). The multivalent processes associated with and around transnational regimes and networks have received wide attention of academic scrutiny from political economy, political geography and political ecology perspectives (Kurtz 2003; McCarthy & Prudham 2004; Robbins 2003; Simon 2003).

It is argued that the emerging transterritorial regimes, particularly in transnational economic and environment arrangements, are reconfiguring the politics of scale and governance. This 'growing routinisation of global network practices', besides signalling 'a perforation of scalar and territorial forms of social organisation' (Amin 2002, 395), is forming systems of structuring of governance and participation through institutionalizing forms of knowledge, instruments and practices at overlapping scales—a process sometimes referred to as 'glocalisation' (Swyngedouw 2000). The process is restructuring global and local relations, particularly the role of state where its functions are being redistributed both to transnational organisations and local institutions at one level, and to non-state actors at another. These complex and multivalent forms of interrelations are mediated through establishing common standards of interaction wherein the specific actors make sense of the regime in their 'localised' conditions. The studies have also pointed out the dynamic and mediated process of the construction of different scales of governance with its wider implications on the definition of location, justice and equity (Mazlish 2005; Okereke 2006).

This, in turn, opens up a whole range of issues for academic scrutiny, since these multivalent terrains of technopolitical mediations as sites of complex social interactions.

Multivalent terrains of mediation

The climate change regime that visibly manifested in the North during the late 1970s evolved to be a transterritorial mechanism with a more or less common knowledge claim (that anthropogenic GHGs have a detrimental impact on life forms and it could be mitigated through human efforts), a platform of organization of expertise and policies (UNFCCC), with a body to generate knowledge and tools (IPCC), and standard structuring procedural techniques (like the Kyoto Protocol) forming a transterritorial space for global atmospheric commons at one level in the course of a score of years. The regime is widely recognized on different levels of transterritorial operations with even the seemingly contending institutional mechanisms like Asia-Pacific Partnership on Clean Development and Climate (AP6) explicitly identifying with it.[3] While this space takes into account the 'differing circumstances, responsibilities and capabilities of parties' (p. 13, Kyoto Protocol), it forms a common regime of climate change through establishing common standards by consensual knowledge claims, procedures of interrelations, and institutional linkages. Presumed to be operating in market economies, the regime is deeply integrated into the political and economic processes in its definition and operation, and tends to follow a technocratic model (or 'the recursive model' according to Weingart, 1999) where expert consensus, policy making and implementation are mutually constructed (Shackley & Wynne 1995).

These issues, to make a generalized categorization, operate at least in three layers of mutually complementing or exclusive analytical directions (complementing or exclusive on the basis of the specific networks they form as part of the process). Primarily, there are the broader standpoints on whether the scientific understanding of climate change is acceptable or not. The knowledge claims concerning climate change, the

anthropogenic basis of climate change and their counter claims form a major strand at this level. The scientific understanding of IPCC and other possible scientific explanations of climate change can also be broadly categorized in this platform. While most of the arguments of the actors at different layers of discourse are discursively integrated into this layer, on which the respective interrelationships of other layers are formed and codified, the process is neither linear nor symmetric as the spectrum of actors are seemingly mediated through diverse interests and preoccupations. Another range of a possible category is on the level of the climate change regime as spearheaded by the UNFCCC on the basis of the techno-scientific understanding of the IPCC. While there is a large following and institutional mechanism functionally constructed on the basis of this dominant understanding, there are alternative readings to the understanding of climate change on the basis of science, institutional mechanisms to address these concerns and the ways in which the whole climate change issues are addressed politically. There is a widely prevalent viewpoint that climate change is not an issue that can be effectively addressed within the framework of environmental modernization, particularly through the way in which the current regime is constructed and maneuver solutions. It is also argued along similar lines that there cannot be an effective solution to anthropogenic climate change within the capitalistic relations, production and consumption patterns. At another level, even among those who identify with the scientific understanding of climate change along the UNFCCC lines and who are inclined to uphold the environmental modernization route to mitigate the adverse outcomes of the process are found to be contesting different policy measures and institutional nuances of the current regime ranging from the outright rejection of the Kyoto mechanisms to issues of representations at different scalar levels or among different actors.

The following part of the article briefly sheds light on the varying mediations at these different levels to observe how the climate change discourses are interceded with multifarious social actors who engage in technopolitical negotiations at multivalent levels.

Knowledge claims and scientific expertise

The formation of the climate change regime in its historical development and contemporary extension is based on a scientific understanding of anthropogenic greenhouse gas emissions and the resultant adverse climatic variations, mainly attributed to the industrial processes that started with the Industrial Revolution. However, the analytical complexity of the formation of the climate regime is intensated with this very scientific premise is contested (Boehmer-Christiansen 2003; Carter et al. 1999; Khandekar et al. 2005). It is generally argued that the atmosphere is a complex geophysical system that cannot be effectively understood by the present levels of analytical comprehension, let alone lead to the claim that there is climate change.

It is argued that modes of interpretation and discursive reconstitution of scientific uncertainty are one of the most telling indicators of ideological standpoints in the climate change discourse (Carvalho 2007). The claims and counterclaims represent the multiplicity of relations and interests that further problematize the regime with issues of the scientification of politics and the politicization of science (Weingart 1999), expertise (Turner 2001), legitimacy, boundary arrangements (Hoppe 2005) etc.

Furthermore the formation also involves the organizational parameters for the generation of knowledge and policies that encounter another layer of problems of legitimacy, codification of knowledge, procedures and instruments. For instance, the scientific consensus is a fundamental variable for the legitimacy claim and organizational principle of the IPCC, although it is contested in different STS studies. Grundmann (2005), for example, compares the case of climate change with ozone layer protection and goes on to argue that scientific consensus is not necessary to achieve ambitious political goals. In addition, it is also argued that scientific consensus mediated through expert organizational frameworks, as in the case of climate change, tend to form 'anchoring devices' and thereby create a stable range of scientific results even when the scientific findings vary substantially (van der Sluijs et al. 1998). Close on the heels of the legitimacy and politicisation of science follows the 'knowledge-ignorance' paradox wherein specific translations of scientific knowledge can mediate public perceptions on specific lines (Ungar 2000; Zehr 2000).

Operational and regulatory mechanisms

Similarly, at different levels of formation and expansion, the climate change regime negotiates with contesting boundaries, legitimacy claims and standards of inclusion and exclusion over knowledge, instruments and spatial forms. Using the per capita emission on the present national basis, for instance, as the yardstick for the allocation of emission caps is argued to be more equitable and sustainable from a Southern perspective (Agarwal & Narain 1999). At a different level, there are arguments which question the inherent spatial organization and standards of the regime, wherein the North-South dichotomy obfuscates the differential vulnerability, accessibility and adoption capabilities of the different countries / regions in the South (Kulkarni 2003), and Central and East European countries (Muhovic-Dorsner 2005). The commodification of atmospheric commons, the operations through market mechanisms and the gross discrepancy of the 60% of emissions reductions (IPCC 1996) needed to meet the 5.2% target (on 1990 benchmark) prescribed by the Kyoto Protocol, is argued, yet again, as a particular framing of climate politics (Byrne et al. 2001).

Framing of problems and definitions

Problems and definitions are framed mainly in two ways. On the broader level, the climate change discourse schematically orchestrates many other issues in such a way that climate change is included as a variable for defining the understanding of the problems. This has major political, social and technological implications at different levels. In the case of energy questions, for instance, there seems to have been a discursive renegotiation on the position on nuclear energy in the light of climate change discussions (Bickerstaff et al. 2008; Weisser et al. 2008). There is an increasing number of studies that look into the existing socio-economic vulnerabilities like poverty, and juxtaposing this with the adaptation to climate change that may exacerbate ongoing socio-economic challenges (e.g. Adger et al. 2003). Similarly, to cite another instance, it is analytically interesting to observe how the studies deal with the future resource

crunch due to climatic variations and the presumption of this scarcity leading to civil unrest and armed conflict (Nordås & Gleditsch 2007; Salehyan 2008; Theisen 2008). Another aspect of framing of issues is also concerned with how different scalar levels deal with the arguments and responsibilities of climate change mitigation and adaptation besides how the actors negotiate with climate change in different locations (Lundqvist & Borgstede 2008; Bulkeley & Kern 2006; Rutland & Aylett 2008). On the other hand, the specific ways of problem framing and definition can inherently entail systematic modes of inclusion and exclusion as a recent study from India demonstrates, where the rich and the socially powerful are able to evade emissions restrictions sytsmically on the basis of the stipulation of 'differentiated responsibilities' that is granted by the climate regime (Ananthapadmanabhan et al. 2007).

At a different level, problematizing the framing of problems and definitions within the contours of the dominant discourse opens up yet another set of challenges within and outside the discourse. This addresses the issues mostly concerned with how the regime formulates, negotiates and renegotiates its underlying objectives, processes, systems or values of interrelations / criteria etc. It is argued that to frame and define the problems and solutions of climate change within the capitalist economic framework and through market mechanisms limits the alternative solutions (Bachram 2004). Moreover, there are convincing arguments that the innovative fusion of contending policy orientations can result in 'clumsy solutions' that are effective for dealing with issues like climate change (Verweij et al. 2006).

Among the very few studies that have been done on how the focal issues are being framed within the climate change regime, van der Sluijs et al. (1998), in one of the earliest attempts, look at the framing of issues around the multivalent character of scientific consensus on 'climate sensitivity'. They propose that the remarkable quantitative stability of the 'climate sensitivity' range (i.e. between 1.5 degree C to 4.5 degree C) has helped to hold together a variety of different social worlds relating to climate change, by continually translating and adopting the meaning of the 'stable' range. Similarly, more recently, Pielke Jr. (2005) analyzed that the restricted definition of 'climate change' by the UNFCCC

as compared to the IPCC has profound implications for science, politics and policy processes in the international response to the climate issue.

On similar lines it can be seen that although the terms 'sustainability' and 'sustainable development' figure in the policy documents and political discourses, they do not specifically define any particular actions or processes. This is broadly the case, even outside the realm of climate discourses, as ever since the Brundtland Commission's report in 1987, these terms have been used to connote different meanings in different contexts (Hopwood et al 2005; Luke 2005). In the same vein, Redclift (2005) argues how a specific framing of sustainable development focuses on rights that are intrinsically linked to neo-liberal economic agendas while addressing the questions of environmental justice.

On the field

As seen above, the climate change regime, while creating a body of knowledge, standards of assessment, and remedial courses for the problem of its own finding, simultaneously generates contestations, resistance and methodological criticisms at all these levels. It is a process of constructing 'particular political and economic spaces, and the specificities of materials, practices and locations which they transform, connect, exclude and silence' (Barry 2006, 250). The climate change regime being a space of political and economic significance, integrates the political and economic interests in the framing of the focal issues / concepts through the creation and flows of knowledge, structuring of relations and the construction of different spatial formations. Precisely because of this, the regime is subjected to multivalent mediations in the fields of its operations at different levels in relation to the principles, operational procedures and practices, effectiveness on the field as per its own definitions etc. As the construction of the regime is located at multivalent sites of scientific, technical, political and social negotiations, it has as many different analytical fields of enquiry besides exploring the implications of the existence and actions of the regime at different levels and on different communities. Assessing the effectiveness of the regime, for instance, is much beyond how the countries implement their obligations in practice, as there are

still significant uncertainties arising from the calculation of emissions and the uncertainties around compliance (Gupta et al. 2003). The fields are highly volatile and politically significant, which prompts Donald Mackenzie (2008) to argue for a 'multiple witnessing and social learning' from different disciplines ranging from anthropology, technology to accounting from a variety of sites where the regime is undergoing construction. It includes the various perceptions of risk and specific forms of scientific and political representation of the perceived vulnerabilities by the communities and others (Martello 2008) and also encompasses the diverse aspects of sociotechnical interactions of flexible mechanisms besides the nuances of the carbon market, particularly those of the networks and actors around CDM and JI projects.

Conclusion

This article reviews the works that problematize the multivalent technical mediations of the climate change regime to explicate the complex and mutually interconnected analytical terrains in the emerging transterritorial networks. This review opens a wide spectrum of research questions that are also to be explored in the area of the technification of politics as being progressively prevalent in the transterritorial economic and environmental arrangements.

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Notes

1 GHGs regulated under the Kyoto Protocol are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs) and sulphur hexafluoride (SF_6). (http://unfccc.int/kyoto_protocol/mechanisms/items/1673.php).

2 As of on December 12, 2008, there are 1261 registered CDM projects across the different developing countries. Among them, India has the largest number with 375 projects, followed by China and Brazil with 323 and 146 projects respectively. Among the investor parties, UK and Northern Ireland invested in 475 projects followed by the Switzerland with 350 projects. Scale wise, the large projects are only marginally higher (with 54.64%) to the smaller projects though the CERs potential is far higher with the large projects.

3 Often held as a platform of the worst present and future emitters (being Australia, China, India, Japan, the Republic of Korea and the United States of America as signatories), AP6 is considered as an alternative to the Kyoto mechanisms. However the partnership treaty says that it 'intends to complement but not replace the Kyoto Protocol'.

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