Mainstreaming climate change into the EIA procedures: a perspective from China

Qi Gao
KoGuan Law School, Shanghai Jiao Tong University, Shanghai, China

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Abstract

Purpose – In the face of climate change, environmental impact assessment (EIA) and strategic environmental assessment (SEA) are expected to translate global or national mitigation and adaptation targets to project and plan levels of decision-making. This paper aims to examine how to transform China's EIA procedures to accommodate consideration of climate change and what constraints might be for doing so.

Design/methodology/approach – The main methodology used in this paper is doctrinal research, which is the primary legal methodology to find the law and interpret and analyse the document. Theoretical research is applied to analyse the ideas and assumptions of the mainstreaming approach. Comparative research is done to consider relevant international experiences.

Findings – Despite well-founded rationale for the mainstreaming approach, entrenched institutional, legal and technical obstacles cannot be neglected in the context of China. Urgent needs to fix existing EIA/SEA loopholes and improve the general enabling environment are also highlighted as a fundamental aspect of mainstreaming.

Originality/value – The potential of mainstreaming climate change into China's EIA procedures remains largely unexplored. As a ground-breaking work from China's perspective, the findings of this paper can serve as an important foundation for future research from legal and other perspectives.

Keywords Climate change, Mainstreaming, SEA, Climate feasibility study, EIA

Paper type Research paper

1. Introduction

The probability of human influence in climate change has been raised by the IPCC (2013) from 90-95 to 95-100 per cent. Being the world's biggest CO_2 emitter (International Energy Agency, 2011), China released its "intended nationally determined contribution" (INDC) in June 2015 (National Development and Reform Commission, 2015). More recently, the Paris Agreement (Article 2) ambitiously declared its goal to keep global warming to "well below 2°C above pre-industrial levels". Nevertheless, specific means to implement and achieve such mitigation targets seems to be less of a concern for global discussion (Christopher, 2008). As the IPCC (2001) highlights interactions of climate change with other environmental stresses, one appealing suggestion is to translate global or national reduction targets to plan and project levels of decision-making through strategic environmental assessment (SEA) and environmental impact assessment (EIA), which have been widely used to address traditional environmental concerns.

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Recent years have also witnessed an increasing emphasis on adaptation to build resilience to climate change related damages (Farber, 2011). Global attention has particularly focused on adaptation in developing countries, as they suffer the most and first from climate change. Being the largest developing country, China is very vulnerable to climate change (IPCC, 2014; National Development and Reform Commission, 2013). Article 7 of the Paris Agreement requires countries to strengthen institutional arrangements to support the synthesis of adaptation related information and knowledge. Adaptation strategies should be considered at various decision-making levels to reduce climate sensitive risks (Article 7). From this perspective, it is argued that the EIA procedures (hereinafter refers to both EIA and SEA) provide potential tools to collect and evaluate information on what to adapt to and how to adapt. This is in line with the "mainstreaming" approach to build resilience to climate change.

By nature, however, EIA is probably not suitable as a primary means to tackle climate change (Christopher, 2008). Although the EIA procedures could be used to mainly ensure *future* plans and projects not to significantly increase greenhouse gas (GHG) emissions or to better adapt to climate change, more comprehensive strategies are needed to deal with *existing* emission sources and climate sensitive sectors and projects (Christopher, 2008). But as a secondary tool, the potential of mainstreaming climate change into China's EIA procedures remains largely unexplored.

This paper aims to examine how to transform China's EIA procedures to accommodate consideration of climate change and what constraints might be for doing so. Both the potentials and boundaries of the EIA procedures are essential in understanding how they may incorporate climate change issues (Christopher, 2008). We begin with a theoretical analysis on the rationale for integrated consideration of climate change via the EIA procedures. Attention will then be paid to the existing climate feasibility study in China as a separate initiative to evaluate climate change impacts. In light of the progress and problems revealed in relevant legislation, key issues concerning the transformation of China's EIA procedures will be discussed in Section 4. Comparative research is also applied to consider relevant international experiences. The European Union (EU) and several countries (represented by Canada and Australia) have pioneered in this area. But the level of progress varies considerably among them (Agrawala *et al.*, 2011). This is followed by an examination of possible obstacles towards integrated consideration. Conclusions will be drawn accordingly in the context of China.

Unfortunately, due to the length limitation and a lack of transparency in relevant decision-making process[1], this paper is unable to provide a detailed first-hand quantitative analysis. Nevertheless, as a groundbreaking work, barriers and potentials identified in this paper can serve as an important foundation for future research from legal and other perspectives.

2. Rationale for integrated consideration of climate change via the environmental impact assessment procedures

As a means that has been widely applied since the late 1990s to deal with gender inequality, AIDS and environmental degradation in developing countries (Oates *et al.*, 2011), the mainstreaming approach is of increasing significance in the context of climate change. It generally indicates that "cross-cutting issues should influence the 'mainstream' activities of development, rather than being addressed in separate initiatives" (Oates *et al.*, 2011). This is in contrast with the fact that many climate change related decisions "continue to be taken with little or no regard to climate change" (Kok and Coninck, 2007). Proponents states that the aim of mainstreaming is "to capture the potential in other policy areas and sectors for

implementing climate-friendly and climate-safe development pathways" (Kok and Coninck, 2007).

In past research and practice, the mainstreaming approach has received more recognition with respect to climate change adaptation than mitigation, although it is in fact necessary for both (Kok and Coninck, 2007). With regard to adaptation, poverty alleviation, rural development, agriculture and disaster management are identified as major areas that require mainstreaming (Kok and Coninck, 2007). For mitigation, issues like energy restructure and security, air quality, human health, transport, trade and finance should integrate climate change concerns (Kok and Coninck, 2007). Development in these areas involves a large number of projects and plans and the EIA procedures play a vital role in their decision-making processes. By incorporating climate change concerns into the EIA procedures, it is expected to:

> [. . .] increase the scientific understanding of climate-sensitive systems under changing climate conditions, to inform the specification of targets for the mitigation of climate change, to prioritize political and research efforts to particularly vulnerable sectors and regions, and to develop adaptation strategies that reduce climate sensitive risks independent of their attribution (Füssel and Klein, 2006).

As a fast-growing developing country, China has been challenged by both industrial and post-industrial environmental risks. The needs for climate change mitigation and adaptation, cleaner water and air are all justifiable and no one claim necessarily prevails over others[2]. Synergies are therefore identified and trade-offs are made among different environmental policy goals. These competing but overlapping needs should be evaluated and considered in an integrated manner. The EIA and SEA are supposed to fulfil such expectation at different decision-making levels. This is particularly referred to by the EU Guidance on Integrating Climate Change and Biodiversity into EIA (European Commission, 2013). The absent of consistent consideration could lead to poor environmental judgement in the age of climate change.

The biggest merit of the mainstreaming approach is probably that:

> [. . .] it can be implemented immediately, without a formal connection to the UNFCCC process, and in this way help the climate regime forward at a time that international negotiations on both climate adaptation and mitigation are at a crucial stage (Kok and Coninck, 2007).

Although the Paris Agreement finally entered into force in November 2016, a shadow has been casted on political will for international cooperation by President Trump's decision to withdraw from the agreement (Shear, 2017). Moreover, the Paris Agreement itself mainly serves as a framework for further cooperation rather than a strict action plan. It does not entail any legally binding emission reduction obligations. Instead, it is the INDCs determined by each participating nation that constitute the basis for mitigation (Article 4). Under such circumstances, the mainstreaming approach is a practical and meaningful way for countries to act on climate change in light of different national circumstances.

3. Climate feasibility study in China: a separate initiative

In contrast to the mainstreaming approach, China has adopted an alternative "stand-alone" tool to evaluate and adapt to climate change impacts. Early in the end of 1999, China's Meteorology Law required certain kinds of plans and projects to go through the so-called "climate feasibility study". The Management Measures on Climate Feasibility Study was then promulgated by the China Meteorological Administration in 2008 to provide detailed requirements.

Only certain kinds of plans and projects "closely related to climate conditions" are subject to climate feasibility study (Article 4)[3]. As can be discerned in Section 4, the range of plans and projects subject to climate feasibility study is more restricted than that of the EIA procedures in China. Moreover, the current regulation fails to provide further explanation on the terms of "important", "major" and "closely related to climate conditions". The discretion is completely left to decision makers, thus giving leeway to bypass the process. In contrast, a mandatory list is adopted in China to specify the kinds of projects that are subject to EIA, and all sectorial and comprehensive plans proposed by governments above the municipal levels are subject to SEA.

The Management Measures (Article 1) alleges to take both climate change mitigation and adaptation into consideration. In fact, based on the title and content of the study, it is the feasibility of proposed activities under certain climate conditions that is the focus of the study. With regard to mitigation, it only considers the impact of plans and projects on local climate[4]. This restriction denies the possibility of translating international or national targets on climate change mitigation into the local decision-making processes.

The Management Measures (Article 8) provides some general requirements on the scope of the study. For example, it should evaluate the probability of extreme weather events and the proposed plan/project's climate suitability, climate risk and potential impact on local climate. Suggestions to prevent or mitigate impacts should be provided accordingly. But the existing regulation fails to provide any operable guidelines regarding the content and extent of the matters to be covered by the study. As will be discussed in Section 4.4.2, Canada and the EU has developed more specific guidelines to facilitate the scoping process.

The design of the study is unable to cope with scientific uncertainty and complexity of climate change. Articles 8 and 9 of the Management Measures designate existing basic data or historical records as the main sources of information for the feasibility study. It reflects an inertia understanding of climate change based on ecological stationarity and scientific certainty. As the study is referred to as "climate" feasibility study rather than "climate change" feasibility study, it seems that it does not intend to or is unable to differentiate climate change with climate variability (Wang and Gao, 2015). Climate variability indicates a year-to-year fluctuation in the climate record and is generally predicable through historical records (He, 2013). According to Article 1(2) of the UNFCCC, however, climate change is "a change of climate [. . .] which is in addition to natural climate variability observed over comparable time periods". Drawing a clear line between climate change and climate variability could be difficult and controversial in practice, but not separating the two concepts is misleading.

The feasibility study should be conducted by qualified institutions. According to Article 5 of the Management Measures, it is the meteorological bureaus that are held responsible for conducting the study for proposed plans. With regard to proposed projects, the study should be done by institutions that have obtained relevant qualification from the China Meteorological Administration (Article 7). A specific Interim Management Measures has been issued by the China Meteorological Administration in 2009. But it is not even as sophisticated as the requirements on EIA qualifications, especially with regard to liability and accountability[5]. In practice, qualifications are usually granted to climate centres established under the China Meteorological Administration and meteorological bureaus at the provincial level. The monopoly status and quasi-administrative feature of climate centres raise genuine concerns for high risk of rent seeking, local protectionism and manipulation of the study.

Article 5 of the Management Measures requires plan-making authorities to take full account of the conclusions of the feasibility study. But it fails to provide any further

procedural guidance on what constitutes as adequate consideration. The Management Measures is merely a department rule, the hierarchy of which is the lowest in China, and it often has little impact on other government sectors. In addition, the meteorological bureaus in China are not powerful compared to other departments relevant to climate change. The situation is slightly different with regard to proposed activities, the feasibility study report of which should be reviewed and authorized by the meteorological bureaus at either national or provincial levels (Article 11). Given the close linkage between climate centres qualified to conduct the study and meteorological bureaus responsible for issuing such permits, the reliability of this procedure is also questionable, to say the least.

Public participation is considered as a valuable mechanism to improve the quality of environmental decision making. Unfortunately, the Management Measures fails to make any arrangements for information transparency and public participation. In contrast, EIA represents a comparatively good example in China for protecting the public's right to participate, although problems still abound in detailed arrangements and implementation (Gao, 2014).

In addition, ecological non-stationarity and scientific uncertainty of climate change justify the necessity to highlight monitoring and follow-up analysis. It is mandatory for the EIA procedures in China, but it is not even briefly mentioned in the Management Measures.

Finally, administrative penalties for violation of the Management Measures cannot generate incentives for compliance. In case of severe non-compliance, such as failing to conduct the feasibility study or committing data forgery, a maximum fine of merely 30,000 yuan is applicable. Combined with the previously mentioned deficits, it can be concluded that climate feasibility study is more window dressing than a substantive tool for climate change evaluation.

As a separate initiative, climate feasibility study completely alienates climate change from traditional environmental concerns. According to Shackley and Wynne (1995):

> [S]ingling out climate change as the prism for investigating systems is a classic form of reductionism since it assumes, *a priori*, that the processes, impacts and responses of relevance in a particular system are indeed those collected under the banner of climate change. Other possible variables are simplified and backgrounded: they are not the key variables of interest however much their interactive importance at a secondary level may be recognized.

Therefore, the following discussion will explore the possibility of incorporating climate change into China's EIA procedures.

4. Key issues on mainstreaming climate change into China's environmental impact assessment procedures

Early in 1997, scholars have envisioned a "conceptual framework for considering integrated assessments", which is characterized by nonlinear, adaptive and participatory analysis, pluralistic consideration of alternatives and a combination of quantitative and qualitative methodologies (Rothman and Robinson, 1997; Füssel and Klein, 2006). Progress in reality, however, has been really slow.

Although several governments have indicated their willingness to move in this direction, only a few of them (represented by Canada) actually developed operational guidelines and/or adjusted regulatory frameworks (Agrawala *et al.*, 2011). Breakthrough progress occurred between 2013 and 2014, during which the Directive 2014/52/EU was adopted to formally incorporate climate change mitigation and adaptation concerns into EIA (Annexes III(1)(f), IV(5)(f)) and a specific EU Guidelines was released to provide further instructions for its member states (European Commission, 2013). Therefore, all EU member states are now

subject to a compulsory obligation to consistently consider climate change with other environmental concerns at the project level.

EIA has been one of the key environmental regulatory tools in China for decades. Currently, the EIA Law (2016) and the SEA Regulation (2008) serve as the key legal documents in this area. Moreover, the Ministry of Environmental Protection (MEP) in China has released several technical guidelines for EIA and SEA. In light of comparative experiences and the status quo of the EIA procedures in China, the following discussion will focus on several key issues affecting the operationalization of an integrated consideration in China.

4.1 The precautionary principle and scientific uncertainty

EIA has been recognized as an important preventive mechanism since its origination. It "rests on cumulative experience concerning the degree of risk posed by an activity" and presupposes "the notion of an objective assessment of risks in order to reduce the probability of their occurrence" (Sadeleer, 2002). EIA is therefore not initially designed to deal with "surprises". Unfortunately, we are currently living in a risk society where surprises abound. Under such circumstances, the EIA itself should be redesigned to deal with such uncertainties in accordance to the precautionary principle, which calls for actions to avoid or diminish unacceptable harm that is scientifically plausible but uncertain (Sadeleer, 2002). Correspondingly, the Directive 2014/52/EU (the EIA Directive up to date) explicitly recognizes the precautionary principle in its preambles.

According to Craig (2010), the assumptions of ecological stationarity fail to "fit a world of continual, unpredictable, and nonlinear transformations of complex ecosystems". It is further pointed out that: "[c]limate change science is unlikely ever to be able to present climate information in the same manner as historical data to which the EA community is accustomed" (Agrawala *et al.*, 2011). Hence, a qualitative approach is preferred rather than relying on quantitative data to predict impact (European Commission, 2013; Sadeleer, 2002). Some basic approaches are further recommended for addressing climate change uncertainties in EIA, such as scenario analysis, sensitivity analysis and probabilistic analysis (Byer and Yeomans, 2007; European Commission, 2013). Public perceptions and lay knowledge are also highlighted to provide a more comprehensive understanding of complex scientific situations (Sadeleer, 2002).

The application of the precautionary principle also requires a more dynamic and learning-oriented decision-making process. Repeated EIA at regular intervals can help public authorities adapt their decisions to new results (Sadeleer, 2002). This is reflected in the adoption of a post-project analysis in the 1991 Espoo Convention (Sadeleer, 2002). Hence, reversible options are also preferred to take advantage of the new knowledge (Sadeleer, 2002).

As revealed in Section 3, challenges posed by scientific uncertainty are not fully recognized by climate change regime in China. The situation is not that optimistic even in Canada. Empirical research demonstrates that many cases of EIA that claim to consider climate change in fact rely on historical climate data at least for some aspects of evaluation (Agrawala *et al.*, 2011). This is attributable to "the difficulties for EIA practitioners to address climate change information and its uncertainties" and "the low accessibility for EIA practitioners to user-friendly climate change information" (Agrawala *et al.*, 2011).

If China did attempt to introduce climate change factors into the EIA procedures, relevant information gaps and technical difficulties will unlikely to be any easier for EIA practitioners in China, which will be discussed in detail later. Moreover, the existing national legislation in China has not explicitly recognized the precautionary principle, although

Wang (2014) broadly interprets the principle of prevention (Article 5 of the 2014 Environmental Protection Law) to include the meaning of precaution.

4.2 Mitigation aspects and adaptation aspects

Traditionally, the EIA procedures are designed to evaluate and prevent a significant impact of proposed actions on environment. With regard to climate change, it means that a proposed action's impact on GHG emissions (e.g. increased emissions or sinks of GHG) should be examined. In addition to this natural extension of EIA, mainstreaming proponents further argue that the EIA procedures should consider the impact of climate change on proposed actions.

It should be noted that possible synergies and conflicts exist between climate change mitigation and adaptation needs (European Commission, 2013). Füssel and Klein (2006) also highlight "differences in the typical temporal and spatial scales at which mitigation and adaptation take place and in their respective information needs". Due to the nature of a proposed activity, the actual evaluation process may focus on one aspect of climate change than the other (Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003).

Empirical study shows divergent practices. Canada and the EU are known for taking a holistic approach to incorporate both aspects of climate change into EIA (Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003; European Commission, 2013). Small Island Developing States, on the other hand, tend to use EIA as a tool to adapt to climate change (Agrawala *et al.*, 2011). This divergence can be attributable to priority differences, for the latter are known to be very vulnerable to climate change.

As analyzed in Section 3, the current regulation and practice of China's climate feasibility study tends to emphasis on the vulnerability of a proposed activity to climate change. Being the world's biggest CO_2 emitter (International Energy Agency, 2011) and a rapidly growing economy, a lack of operable mechanisms to evaluate the impact of a proposed action on climate change will hinder the implementation of China's INDC and its progress evaluation under the Paris Agreement.

4.3 Integrated consideration of climate change at the levels of environmental impact assessment and/or strategic environmental assessment

Climate change mitigation and adaptation can be better considered at what levels of EIA is another question put in front of mainstreaming proponents. Compared to well-developed EIA process for specific activities, SEA is still a relatively new concept, especially to developing countries. At the time of writing, China only applies SEA to certain kinds of plans, while policies are not subject to SEA.

Some argue that efforts would be better spent on integrating climate change into SEA (Christopher, 2008). It is noted that plans usually have a more profound and cumulative impact on climate change mitigation and adaptation than site-specific projects (Christopher, 2008). Plan making is also crucial in translating national mitigation and adaptation targets in respective sectors, such as transportation, energy and agriculture (Wende *et al.*, 2012). But others point out that climate change itself "is a result of a series of individually small actions, and the 'solution'- if there is one- will likely result from a series of separate steps" (Christopher, 2008). Even if GHG emissions are more difficult to evaluate at the project level, specific measures to adapt to climate change are certainly required for individual projects.

Among the few pioneers that actually implement on mainstreaming climate change into the EIA procedures, The Netherlands integrates climate change into SEA, while Canada and Australia incorporates climate change into EIA (Modak and Ginoya, 2013). The EU

Guidelines recognizes the necessity to incorporate climate change at both project and strategic levels of assessment (European Commission, 2013), but so far the SEA Directive has not been amended to reflect changes toward this direction.

While there are merits on both sides theoretically, challenges in reality will likely to make a difference in the process of developing operational guidelines, such as access to climate change information, availability of reliable climate change analysis models and the performance record of EIA and SEA. As will be discussed later, EIA is relatively more advanced than SEA in China, and it imposes more obligations on developers rather than governments. If China did decide to mainstream climate change into the EIA procedures, there is less resistance at the level of EIA than SEA. This is in line with the process of relevant legal reform at the EU level.

4.4 Potential entry points for considering climate change via the environmental impact assessment procedures

Mainstreaming climate change into the EIA procedures requires proper adjustments on the existing mechanisms to bridge the gap between intention and action. This is reflected in the introduction of climate change parameters, methodologies and thresholds; increasing significance of certain EIA/SEA phases; and urgent needs to fix existing EIA/SEA loopholes. Given the complexity of many issues involved, only a few countries and the EU have developed specific guidelines to facilitate relevant practice (Agrawala *et al.*, 2011; European Commission, 2013; Wentz, 2015).

4.4.1 Screening. The screening process determines whether an EIA or SEA process will be required for certain proposed actions (European Commission, 2009a). An EIA or SEA is usually necessary only when a proposed activity is likely to cause a "significant" adverse impact. The EU Directive 2011/92/EU (the EIA Directive) adopts two approaches to screen projects. All projects listed in Annex I are subject to EIA. Projects listed in Annex II are left to the discretion of EU member states, which can be decided either through a case-by-case examination or according to criteria set by the member states. Annex III then set out the selection criteria that should be applied to the case-by-case examination and threshold setting.

Proponents suggest that the criteria for threshold setting should be readjusted to screen proposed activities that are likely "to have significant effects on, or be significantly affected by climate change" (European Commission, 2013)? Drawing a line here, however, is a controversial judgment. Some argue that the threshold should be set based on "the proportion of global anthropogenic GHG emission that can be attributed to a particular action" (Wentz, 2015). But the nature of climate change challenge makes it impossible to attribute climate impacts to any single action (Wentz, 2015).

In a revised draft guidance of Council on Environmental Quality in the USA, a reference point of 25,000 metric tons of CO_2 equivalent annually is recommended as a threshold for quantitative analysis of GHG emissions (Wentz, 2015). But it does not clarify on whether this benchmark applies to both direct and indirect emissions (Wentz, 2015). It also fails to explain why other parameters (e.g. carbon sinks and emission intensity) are not accepted as an independent factor for screening. The modules used to quantify GHG emissions can be subject to disputes as well. With regard to climate change impact on a proposed activity, the draft guidance provides no specific benchmark, but it lists a range of impacts that should be incorporated in assessment (Wentz, 2015). Namely, climate change adaptation is considered as an issue for scoping.

The EU Guidelines highlights the importance of incorporating climate change into environmental assessment "at an early stage (screening and scoping)", but the screening

process is only suggested to integrate climate change issues "where appropriate" (European Commission, 2013). Main climate change concerns are listed to help EIA practitioners develop questions to be asked in the screening process (European Commission, 2013), but no clear criteria or thresholds are provided. Annex III(1)(f) of the Directive 2014/52/EU introduces climate change adaptation as a screening criterion for the EU member states, but mitigation is not explicitly considered as a factor for screening. Moreover, no amendment is made in Annex I with reference to climate change, meaning that Annex I projects are only required to incorporate climate change at the scoping stage.

Climate change is not treated as a ruling factor that could trigger an EIA in Canada. Consideration for both aspects of climate change is introduced in the process of scoping (Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003). This is probably due to the difficulty to attribute climate change impacts to any single action and the idea that climate change is just one of the factors to be weighed against others in the EIA processes (Christopher, 2008).

In China, all proposed projects that may cause a significant environmental impact should prepare an EIA report according to Article 16 of the EIA Law. A mandatory list is adopted to enumerate the kinds of projects that are subject to EIA (Ministry of Environmental Protection, 2015). The selection criteria usually include the size and location of the project, and characteristics of potential impacts. There is no absolute answer on which screening approach is more appropriate in the context of climate change. But necessary information transparency and public involvement should not be neglected during the preparation of a mandatory list. So far, public participation at the screening stage is not mandatory in China, but the MEP has voluntarily sought public opinions in recent process to revise the Catalogue of Construction Projects Subject to EIA (Ministry of Environmental Protection, 2014). The process, however, remains distant to general public, as the information released may be considered to be too technical.

With regard to SEA, the threshold setting is more likely to be a result of political bargaining rather than scientific reasoning. Sector-based plans (e.g. industrial plans, agriculture plans, transportation plans and energy plans) and comprehensive plans (e.g. plans concerning the utilization of land, river basin development plans and marine area exploitation plans) proposed by governments above the municipal levels are subject to SEA in China according to Articles 7 and 8 of the EIA Law.

As there is no clear screening standard on SEA in the first place, climate change factors can only be introduced to SEA via the scoping process. With respect to EIA, given the screening process is separated from specific EIA practice, any attempt to incorporate climate change consideration via this process will eventually lead to a revision of the mandatory list. In light of the controversies mentioned above, it would be difficult to justify the introduction of any particular climate change parameter as an independent factor at this stage. In fact, climate feasibility study also fails to interpret the criterion of "closely related to climate conditions". The types of projects and plans that should go through climate feasibility study are very likely to be subject to EIA and SEA as well. Therefore, consistent consideration of climate change through the EIA procedures will automatically broaden the range of projects and plans that should be evaluated for climate change impacts.

4.4.2 Scoping. The scoping process determines the "content and extent of the matters to be covered in the EIA report" (European Commission, 2009a). Canada has developed several checklists for EIA practitioners to identify possible concerns in relevance to both GHG emissions and climate sensitivity. The EU Guidelines also identifies a range of key climate change concerns to consider via EIA. However, one should realize that every case is different and the checklist should be tailored in practice (European Commission, 2013).

With respect to mitigation, the Canadian Guidelines suggests that considerations should be given to, where appropriate, direct GHG emissions, the level of GHG emission intensity, direct impact on large scale carbon sinks and a management plan to mitigate impacts (Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003). In contrast, the EU Guidelines recommends the evaluation of both direct and indirect GHG emissions. In particular, the latter refers to GHG emissions "due to an increased demand for energy" or "caused by any supporting activities or infrastructure that is directly linked to the implementation of the proposed project" (European Commission, 2013). The Guidelines then provides links to methodologies for calculating GHG emissions (European Commission, 2013).

In addition, a range of climate parameters, such as temperature, precipitation, sea level, evaporation rate and wind velocity, are included in the Canadian Guidelines to evaluate the sensitivity of proposed projects (Federal-Provincial-Territorial Committee on Climate Change and Environmental Assessment, 2003). Discretions are left for the practitioners to decide which parameters should be applied in specific circumstances. Correspondingly, available information should be gathered and analysed, and a management plan should be developed to alleviate or avoid potential climate risks on projects (Christopher, 2008). Similar concerns are listed in the EU Guidelines as well (European Commission, 2013). In addition to historical data, it is emphasized that relevant assessment should identify and present climate change scenario (European Commission, 2013).

Theoretical and practical challenges, however, exist with regard to the consideration of impacts that are indirect, local, long-term, transboundary or cumulative (Christopher, 2008). The EU Guidelines therefore recommends the identification of evolving baseline, the use of significance criteria rather than magnitude standard and the application of causal chains or network analysis (European Commission, 2013).

As will be discussed Section 5, proper identification and evaluation of climate change parameters rely on advanced climate change methodologies, technologies and information, which could be very challenging in practice, especially in developing countries. Moreover, it should be noted that the Canadian and EU Guidelines focus on integrated assessment at the level of specific projects. Therefore, the parameters mentioned above may not be appropriate in the case of SEA.

4.4.3 Evaluation. The availability and reliability of necessary data and information is crucial for proper integrated assessment. This is a potential bottleneck for EIA practitioners. For one thing, the necessary data may not exist due to a lack of awareness or technology. Even if information is available, it may not be user-friendly for practitioners (Agrawala *et al.*, 2011). Uncertainties associated with climate change projections could also affect the credibility of results (Agrawala *et al.*, 2011). Combined with a lack of experience for EIA practitioners to deal with climate change information and its uncertainties, Canadian's implementation in the field has proved to be problematic (Agrawala *et al.*, 2011).

In the case of climate feasibility study, Article 9 of the Management Measures stipulates that the meteorological data used for evaluation should be either directly provided by the meteorological bureaus or pre-reviewed and approved by them. Only if the available data were not sufficient, can aerological sounding be conducted according to existing legislation and standards. The utilization of official data can be interpreted as an attempt to secure reliability of the study. But a lack of opportunities to question the authenticity of such information poses serious danger of manipulation. While official data can still be considered as a convincing source of information, other sources, especially those with contradictory implications, should be allowed to be considered in the integrated evaluation.

In addition, due to institutional reasons, the meteorological bureaus and their subordinate climate centers do have more resources (e.g. funding, professionals and equipment) than

environmental protection authorities and traditional EIA practitioners to evaluate climate change impacts. Under such circumstances, cooperation from meteorological bureaus and climate centers remains crucial in practice, at least in a short term. As the EIA service market matures and institutional reform deepens in China, there may be a possibility that the situation could be gradually improved in the future. Attention should be paid to imbalanced development of meteorological infrastructure and expertise across China as well.

Moreover, future guidelines on integrated evaluation should try to separate climate change and climate variability to consider scientific uncertainty that underlies climate change concerns. Information and technical gaps will therefore be revealed and then improvement efforts can be made accordingly.

As mentioned in the beginning of Section 4, integrated assessment in the age of climate change is featured with pluralistic consideration of alternatives. Christopher (2008) also highlights the potential of utilizing alternative analysis in the USA to incorporate climate change considerations. This opportunity, however, barely exist in China where alternatives are not a compulsory part of the EIA procedures.

4.4.4 Public participation. As the international debate on climate change has been distant from local public, the EIA procedures are expected to provide valuable opportunities for the public to participate in climate change debate and knowledge expansion on a case-by-case basis. In light of scientific uncertainty and compounded environmental stresses, public participation is crucially needed to increase the accountability of decision-making to interest groups (Sadeleer, 2002) and hence provide legitimacy to controversial development decisions. Effective public participation could also contribute to better understanding of complex scientific situations and developing suitable measures to mitigate or adapt (Agrawala *et al.*, 2011; Sadeleer, 2002).

Necessary transparency and public awareness are considered as key aspects of capacity building in Article 11 of the Paris Agreement. Article 12 further requires countries to take measures to enhance public access to information and public participation. China's EIA procedures have a relatively better record in this aspect than climate feasibility study. But there remains a long way to go before it could meet the above expectation in practice.

In the USA, public participation is considered as an important approach to introduce climate change concerns into the EIA process even when the USA is not subject to any mandatory emission reduction targets (Christopher, 2008). In China, however, climate change is not a priority concern for the general public compared to other environmental problems, such as PM 2.5 pollution. Although civil society development is gaining momentum in China, many legal and institutional restrictions on the establishment and operation of NGOs still exist (Gao, 2014), which considerably lower the capacity of NGOs to actively participate.

Moreover, existing legislation on public participation in China's EIA procedures is still problematic. In a nutshell, public participation in the SEA process suffers from limited opportunities for the public to participate in SEA[6], restricted access to information, late introduction of public participation, no detailed arrangements on participation procedures and the absence of judicial remedy (Gao, 2014).

The EIA process is the only mechanism in China that has developed a relatively comprehensive legal framework to facilitate public participation (Gao, 2014). Even so, public participation in China's EIA process remains to be highly controlled by developers and governments. Gao (2014) repeatedly criticizes the lack of requirements for participation at earlier stages of EIA[7], insufficient information disclosure, short minimum time-frame set for public participation (10 days), inappropriate approaches applied to seek public opinions[8] and insufficient requirements on environmental protection authorities to consult public

during the review of EIA reports[9]. As a result, the public is often unwilling to actively participate in a window dressing procedure.

Under such circumstances, to what extent public participation can contribute to mainstreaming climate change into China's EIA procedures in practice is highly doubtful. Climate change response not only requires renovation of traditional environmental law but also demands better design and implementation of many existing environmental mechanisms and the general improvement of enabling environment. In this sense, arguments in favour of mainstreaming climate change into the EIA procedures will add momentum to further enhancement of public participation in China.

4.4.5 Monitoring and follow-up analysis. In the context of scientific certainty, traditional EIA procedures build on the idea of taking *ex ante* measures to prevent the occurrence of environmental problems. Hence, a follow-up analysis is often not mandatory in many EIA procedures across the world. In contrast, a more dynamic, learning oriented decision adjustment process is recommended to evaluate climate change impacts (Ruhl, 2010; Farber, 2009). Through monitoring and follow-up analysis, the initial projections of climate change can be verified or modified. The flexibility to change decisions is crucial in case the predictions were incorrect or new information became available (European Commission, 2013; Sadeleer, 2002).

According to Articles 15 and 27 of the EIA Law, a follow-up analysis during and/or after the implementation of proposed plans and projects is mandatory, and measures shall be taken to mitigate environmental impacts[10]. Moreover, environmental protection authorities should carry out a follow up inspection on environmental impacts of a proposed project (Article 28). But no liability is stipulated for violation; hence, the compliance of follow-up analysis is not guaranteed. As will be revealed in Section 5, in a country where the EIA procedures have a poor reputation in general, one should not assume that the follow up analysis can function properly.

5. Obstacles for mainstreaming climate change into China's environmental impact assessment procedures

5.1 Institutional barriers

The mainstreaming approach indicates that "actors whose main tasks are not directly concerned with mitigation of, or adaptation to, climate change also work to attain these goals" (European Commission, 2015). The introduction of climate change discourse is therefore expected to promote cooperation among government sectors. In China, however, climate change regulation has to struggle with, if not aggravates, deep rooted institutional barriers and bureaucratic infighting among different government sectors (Wang and Gao, 2015).

According to Article 10 of the Environmental Protection Law, the MEP is in charge of China's environmental protection, but in reality, it often fails fulfil such expectation. With regard to climate change, it is the National Department and Reform Commission (NDRC) that plays a dominate role in decision making (Wang and Gao, 2015). To some extent, this is a practical and preferable choice. Climate change response calls for profound economic reform and the NDRC is a macroeconomic management agency that enjoys broad administrative and planning control over the Chinese economy. As a much more powerful institution, the NDRC is arguably better equipped to translate national mitigation and adaptation targets to different levels of planning.

The downside of this administrative arrangement is that climate change regulation is largely isolated from environmental governance regime (Wang and Gao, 2015). A holistic consideration of climate change and other environmental concerns will lead to power expansion of the MEP, which is very controversial due to entrenched bureaucratic interests.

In nature, however, climate change is a part of the bigger picture of environmental protection. It reshapes the scientific basis of environmental protection and natural preservation (Wang and Gao, 2015). In addition, effective climate change response still relies on the improvement of existing environmental legislation and its implementation (Wang and Gao, 2015). But the prospect of institutional reform towards this direction is not optimistic at the moment.

5.2 Challenges on technology and resources

Climate change entails a degree of scientific uncertainty that is unaccustomed to the existing environmental regulatory mechanisms. Disputes concerning methodologies, parameters, models and technologies applied for integrated assessment have been highlighted by past empirical research (Agrawala *et al.*, 2011). This is one of the main reasons for the majority of EU countries not to evaluate climate change impacts via the EIA procedures before the revision of the EIA Directive in 2014 (European Commission, 2009b). Nowadays, challenges are still highlighted due to the long-term and cumulative nature of impacts, complexity of cause–effect relationship and scientific uncertainty (European Commission, 2013).

China currently fails short of a strong scientific background to support consistent climate change assessment on a frequent basis. The availability and reliability of necessary information also affect the accuracy of integrated assessment. The above obstacles are particularly challenging for less developed regions. Unfortunately, these areas have been targeted by many controversial development projects and plans.

A lack of necessary financial and human resources and unbalanced distribution of limited resources further aggravate the prospect for integrated consideration. Climate change assessment via the EIA procedures entails additional work compared to traditional EIA or SEA (Agrawala *et al.*, 2011). Due to the immaturity of EIA service market, existing institutional barriers and unbalanced regional development, one can safely predict that the provision of necessary resources is likely to be insufficient in China.

5.3 Malfunction of the environmental impact assessment procedures in China

The track record of the EIA procedures in China is far from reassuring, even absent the complications generated by climate change. It is therefore concerned that mainstreaming climate change into the EIA procedures could be too much to ask for an overstretched, malfunctioned system.

The ineffectiveness of the SEA procedure in China can be attributed to the problems of its own design and deficiencies of the environmental administrative regime. Main problems include, but are not limited to, a lack of alternative consideration, insufficient requirements on information disclosure and public participation, deficient noncompliance and liability requirements[11], restricted government budget for conducting SEA, and a relatively weak status of environmental protection authorities against other governmental sectors (Gao, 2014).

EIA is relatively more sophisticated than SEA in China. This is partly due to the fact that obligations to conduct EIA in China are mainly applied to developers, instead of the governments responsible for decision-making. Hence, there are less political barriers for adopting more detailed and stringent requirements. But problems suffered by SEA also exist to varying degrees in EIA (Gao, 2014). Recent years have witnessed some reform measures to improve the effectiveness of EIA, represented by the revision of the Environmental Protection Law in 2014 to require the disclosure of full EIA report (Article 56), the reform to separate the EIA agencies that used to be subordinate to environmental protection authorities (Liu, 2015) and the revision of the EIA Law in 2016 to increase punishment for failure to conduct EIA (Article 31). But the effectiveness of these measures remains to be seen.

Given the unsatisfactory record of the EIA procedures in China, a difficult question is as follows: if the existing regulatory regime has failed to perform effectively, is the mainstreaming approach necessarily more preferable than separate initiatives when dealing with cross-cutting issues?

6. Conclusions

With increasing pressure from climate change and growing momentum on mainstreaming, China now faces a stark dilemma regarding how to bridge between distant global aspirations and domestic decisions. The mainstreaming proponents argue that climate change can be addressed at smaller scales via the EIA procedures. A holistic consideration of climate change and other environmental protection goals is ideal for dealing with potential synergies and trade-offs.

But notable challenges and difficulties for doing so pose serious questions on the feasibility and effectiveness of its implementation in China. China has used to take separate initiatives on dealing with climate change. Political inertia and entrenched vested interests will likely to stagnate reforms towards integrated assessment. Combined with unresolved challenges on technology and resources and the existing deficiencies of the EIA procedures in China, the mainstreaming proponents seem to be unable to provide a realistic prospect to generate incentives for reforms.

At this stage, it is more likely that China will continue to address climate change issues in a more separate way. Nevertheless, it is valuable to at least put the other option on the table for discussion. The early stage of integrated consideration should not be the reason for rejection. Rather, it should serve a reasonable justification for more research and pilot practice. A learning by doing process should be applied to further explore and test the prospect of this innovative approach in China. Compared to climate change mitigation, adaptation at a plan or project level may be more attractive for policy makers at the moment.

It is hoped that the introduction of climate change discourse into the EIA procedures can generate more momentum on improving pre-existing deficiencies of the EIA mechanisms and the general enabling environment in China. This level of mainstreaming is so basic and fundamental that it tends to be overlooked in the process of climate change related reforms. As reforms at this scale usually involve many vested interest conflicts, it is worried that mainstreaming at this level may overload climate change discourse. But without progress in this sense, the achievement of mitigation and adaptation targets cannot be guaranteed in the long run.

Notes

1. For example, a full EIA report in China was not accessible for the general public until the revision of the Environmental Protection Law in 2014. The report of climate feasibility study remains inaccessible to the public in China until the day of writing.
2. Of course, priorities vary given different circumstances and preferences.
3. In particular, it refers to urban and rural plans, development and construction plans on crucial sectors or regions; important infrastructure projects, major public projects and large-scale construction projects; important regional economic development projects and major projects to restructure regional agriculture; large-scale development projects on wind and solar energy; other plans and projects required by law.
4. Local climates describe those climates which have influence over very small geographical areas, perhaps only a few miles or tens of miles across.

5. The qualification approval of EIA agencies has been subject to fierce criticism in China, and a reform has been initiated to tighten the management of EIA agencies (Ministry of Environmental Protection, 2013).
6. Public participation in China only applies to SEA of specific/sector-based plans. It is not a mandatory process during the SEA of comprehensive plans.
7. Public participation is generally introduced in the EIA process when the EIA report is almost finished.
8. The Interim Measures of Public Participation in EIA lists several approaches for public participation, ranging from questionaries to hearings. In reality, the public is often involved only via questionaries, which are mainly designed based on similar templates and can be easily manipulated (Chen, 2015).
9. Most requirements on public consultation apply to the developers rather than the environmental protection authorities.
10. In particular, a follow-up analysis is required for plans after implementation and for projects during their construction and operation processes.
11. The most common remedy is administrative punishment under the Civil Servants Law, and there is no access to justice for the public on the matter (Gao, 2014).

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About the author

Qi Gao obtained her PhD degree from the School of Law, Western Sydney University. She lectures in Environmental Law at KoGuan Law School, Shanghai Jiao Tong University. Her research interests have been on environmental concerns in Asia Pacific regions, especially with regard to transboundary water resources management and climate change adaptation. Her doctoral thesis focused on transboundary legal disputes among riparian states of the Mekong River, which was published by Brill/Martinus Nijhoff in 2014. In addition, she has been doing research on environmental procedural rights, including access to information, public participation and access to justice. A more transparent, participatory and accountable decision-making process is key to environmental good governance in China. Qi Gao can be contacted at: gaoqi0304@gmail.com