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Climate policy integration in the land use sector: Mitigation, adaptation and sustainable development linkages

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ABSTRACT

This article re-conceptualizes Climate Policy Integration (CPI) in the land use sector to highlight the need to assess the level of integration of mitigation and adaptation objectives and policies to minimize trade-offs and to exploit synergies. It suggests that effective CPI in the land use sector requires i) internal climate policy coherence between mitigation and adaptation objectives and policies; ii) external climate policy coherence between climate change and development objectives; iii) vertical policy integration to mainstream climate change into sectoral policies and; iv) horizontal policy integration by overarching governance structures for cross-sectoral coordination. This framework is used to examine CPI in the land use sector of Indonesia. The findings indicate that adaptation actors and policies are the main advocates of internal policy coherence. External policy coherence between mitigation and development planning is called for, but remains to be operationalized. Bureaucratic politics has in turn undermined vertical and horizontal policy integration. Under these circumstances it is unlikely that the Indonesian bureaucracy can deliver strong coordinated action addressing climate change in the land use sector, unless sectoral ministries internalize a strong mandate on internal and external climate policy coherence and find ways to coordinate policy action effectively.

1. Introduction

The 5th Assessment Report of the Intergovernmental Panel on Climate Change calls for a form of development that 'combine[s] adaptation and mitigation to realize the goal of sustainable development' (Denton et al., 2014)). The main justification for this integrated approach to climate change adaptation and mitigation is that climate resilience, or the ability of socio-ecological systems to recover from climate change impacts, and consequently to adapt to climate change, is linked to whether we also achieve climate change mitigation (New et al., 2011). Combining the two climate policy objectives requires exploitation of synergies, minimization of trade-offs and development of institutional linkages between adaptation and mitigation (Swart and Raes, 2007).

Somewhat surprisingly, the literature on climate policy integration (CPI) has rarely examined the interactions between climate change adaptation and mitigation in depth. It has instead typically discussed mainstreaming climate change: integrating *either* climate change mitigation *or* climate change adaptation with sectoral policies (Adelle and Russel, 2013). CPI studies draw heavily on environmental policy integration (EPI) literature and highlight the importance of addressing trade-offs between climate change and sectoral policy objectives, indicate that mainstreaming is critical to support sustainability, highlight the distinct nature of timing of mitigation and adaptation, and the lack of linkages between the two climate change objectives in certain sectors (Jordan and Lenschow, 2010; Klein et al., 2005; Kok and de Coninck, 2007; Wilbanks et al., 2007). The linkages between mitigation and adaptation are more often considered in studies by climate change and international development scholars. These studies find that in the land use sector integrated approaches to mitigation and adaptation can help to reduce risk of impact damages, can help

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local people to address trade-offs and exploit synergies in agriculture and forestry and reduce threats to biodiversity and food security (Ravindranath, 2007; Verchot et al., 2007; Yohe and Strzepek, 2007). The major constraints to such integrated approaches are the gaps in knowledge about trade-offs and synergies at the local level and between local and global scales (Jones et al., 2007; Locatelli et al., 2015).

This paper develops a new conceptual framework for analyzing CPI that incorporates climate change mitigation *with* adaptation aims as opposed to focusing only on mainstreaming mitigation *or* adaptation into development policies. This redefines the concepts of internal and external CPI to consider the interactions between mitigation and adaptation. The framework is then used to examine CPI in the Indonesian land use sector, to analyze the evolution of the climate change policy architecture, and to explore how climate change, land use and development policies address interactions between these multiple policy objectives.

2. Framework for integrating mitigation with adaptation in climate policy

This section outlines the revised analytical framework for CPI that includes the integration of mitigation with adaptation policy objectives. The framework builds on the concepts of policy coherence among multiple policy objectives and vertical and horizontal dimensions of policy integration (Lafferty and Hovden, 2003; Persson, 2007). Yet, in the literature there is little consistency in the use of terms 'policy coherence' and 'policy integration'. Their meaning has been interpreted differently and they are sometimes used interchangeably (Adelle and Russel, 2013; den Hertog and Stroß, 2013; Nunan et al., 2012; Russel and Jordan, 2010; Scobie, 2016). For analytical purposes we follow Nilsson et al.'s (2012) suggestion to use 'policy coherence' to refer to policy outputs and outcomes, or the consistency of multiple policy objectives and associated implementation arrangements, and 'policy integration' to refer to the integration of governance arrangements (administrative and organizational structures) and policy making processes. Consequently, we define CPI as the integration of multiple policy objectives, governance arrangements and policy processes related to climate change mitigation, adaptation and other policy domains. We discuss below the three key building blocks of the analytical framework in more detail.

2.1. Integrating mitigation and adaptation objectives

Unlike other definitions of CPI (Adelle and Russel, 2013; Kok and de Coninck, 2007), ours explicitly refers to integrating the two climate change objectives of mitigation and adaptation. In the land use sector there are many direct, indirect, positive and negative linkages between mitigation and adaptation (Locatelli et al., 2015). For example, adaptation strategies such as soil conservation can help sequester carbon (Maraseni et al., 2012). Yet, nitrogen fertilization and energy-intensive irrigation can increase carbon emissions (Moser, 2012). Similarly, carbon market revenues can contribute to adaptation through diversification of livelihoods and improved resilience to climatic shocks (Campbell, 2009). Other mitigation measures, such as fast growing tree monocultures aimed at maximizing carbon sequestration may hinder adaptation (Ravindranath, 2007). The existence of these linkages means that it can be advantageous to integrate the two climate change objectives: doing so when devising climate change policies in the land use sector can avoid incoherence in policy design and lead to more effective outcomes.

Positive interactions generate co-benefits when a policy or action intended to achieve improved adaptation (or mitigation) outcomes also have a positive impact on mitigation (or adaptation). An approach is integrated if a policy or action is intended from the outset to contribute to both outcomes simultaneously to achieve synergies between them. But mitigation and adaptation co-benefits can also originate from non-climate policy objectives and actions and vice versa. These interactions are the most relevant ones for mainstreaming climate change objectives into sectoral policies. Negative impacts of mitigation or adaptation policies on one another and of non-climate policy objectives on either mitigation or adaptation are instances of trade-offs (Locatelli et al., 2015) (Table 1). This is not to say that integrated approaches require the merger of mitigation and adaptation institutions, policies or actions. They do, however, require the consideration of both objectives simultaneously in order to exploit synergies and minimize trade-offs (Swart and Raes, 2007).

2.2. Internal and external climate policy coherence

The interactions between mitigation and adaptation constitute the second building block of the analytical framework: the distinction between two different dimensions of climate policy coherence. The CPI literature refers to policy coherence as the consistency of climate change and non-climate policy objectives, also referred to as mainstreaming climate change (Adelle and Russel, 2013). Along similar lines, the EPI literature distinguishes between internal policy coherence, which refers to interactions between policy objectives within a single policy domain, and external policy coherence, which refers to interactions between different policy domains (Nilsson et al., 2012). However, the CPI and EPI literatures do not explicitly consider coherence between mitigation and adaptation objectives.

We refer to *internal climate change policy coherence* as coherence between climate change mitigation and adaptation, independently from whether it happens within or across policy domains (cf. Nilsson et al., 2012). In other words, *internal climate change policy coherence* refers to mutually beneficial practices (synergies and co-benefits) and the reduction of negative interactions (trade-offs) between mitigation *AND* adaptation. This kind of climate policy coherence has seldom been investigated in depth in the CPI literature. Conversely, we refer to *external climate change policy coherence* as positive interactions supporting mutually beneficial

Table 1
Types of interactions between adaptation, mitigation and non-climate objectives and actions.

General categories	Interaction categories	Label
Co-benefits/trade-offs	Adaptation with mitigation co-benefits/trade-offs	A → +M; A → −M
	Adaptation with other co-benefits/trade-offs	A → +O; A → −O
	Mitigation with adaptation co-benefits/trade-offs	M → +A; M → −A
	Mitigation with other co-benefits/trade-offs	M → +O; M → −O
	Non-climate action with co-benefits/trade-offs for adaptation	O → +A; O → −A
	Non-climate action with co-benefits/trade-offs for mitigation	O → +M; O → −M
Integrated approach	Integrated approach (simultaneous consideration of A and M objectives)	A&M → +A + M

M = mitigation; A = adaptation; O = non-climate policy objectives and actions; → ' results in'; + positive impact; − negative impact.

Table 2
Four dimensions of Climate Policy Integration (CPI).

		Administrative & Organizational Structures & Processes	
		Vertical CPI	Horizontal CPI
Policy Coherence	**Internal Climate Change Policy Coherence** (Integrating M and A policy objectives) (1)	Integrating climate change mitigation WITH adaptation processes/ objectives across administrative responsibilities within one sectoral domain Examples: *Integrating* M *AND A in the forestry sector*	Integrating climate change mitigation WITH adaptation processes/objectives across sectoral domains Examples: *Integrating* M *AND A across the forestry and agricultural sectors*
	External Climate Change Policy Coherence (Mainstreaming M or A into sectoral policies) (2)	Mainstreaming mitigation OR adaptation across administrative responsibilities within one sectoral domain Examples: *Mainstreaming* M *OR A in the forestry sector*	Mainstreaming mitigation OR adaptation across multiple sectoral domains Examples: *Mainstreaming A OR* M *across the forestry and agricultural sectors*

M = mitigation; A = adaptation; (1) *Internal coherence includes:* A&M → +A + M; A → +M; M → +A; (2) *External coherence includes:* A → +O; M → +O; O → +M; O → +A.

practices (synergies) and the reduction of negative interactions (trade-offs) between climate change aims (mitigation *OR* adaptation) *AND* non-climate policy objectives. This dimension of policy coherence refers to the most commonly analysed form of mainstreaming climate change efforts into sectoral or broader development policies (Table 2).

2.3. Vertical and horizontal CPI

The third building block refers to vertical and horizontal dimensions of policy integration (Lafferty and Hovden, 2003). They refer to distinct aspects of the administrative structure climate policy and have been understood differently by different EPI and CPI scholars (Jordan and Lenschow, 2010; Nunan et al., 2012). Therefore, we highlight that we follow Lafferty and Hovden's (2003, p.13) definition when referring to the term 'vertical' in a 'functional sense' to the mandates, roles and interactions within the responsibility of one sectoral ministerial authority or within one policy domain such as forestry or climate change. In contrast, other scholars often refer to 'vertical' integration as 'vertical constitutional division of power' (Lafferty and Hovden, 2003, p.14), for example between regional, national and sub-national authorities. For us, vertical CPI refers to the extent to which a specific sector or policy domain has adopted procedures that facilitate the adoption and implementation of climate change objectives (Adelle and Russel, 2013). Evidence of effective vertical CPI includes the formulation and implementation of sectoral climate change plans, which requires well specified targets, timetables and reporting requirements (Lafferty and Hovden, 2003).

Horizontal policy integration refers to the institutional interactions across distinct sectors, or 'the extent to which a central authority has developed a comprehensive cross-sectoral strategy' (Lafferty and Hovden, 2003, p.14). Evidence of effective horizontal policy integration includes, an authoritative long-term climate change policy with timetables and targets, the presence of a climate change specific authority mandated to supervise, coordinate and implement climate change policy, the requirement for sectoral ministries to report to a central authority, and a clear indication of sectoral responsibility for overarching goals (Lafferty and Hovden, 2003). Importantly, because environmental bodies with coordination roles, such as environmental ministries, rarely have the authority to impose decisions on sectoral ministries, effective horizontal integration also requires the presence of a central authority with the mandate to oversee and monitor policy integration processes. This might often be required despite the presence of a dedicated inter-ministerial body that undertakes cross-level coordination (Jacob and Volkery, 2004) (Table 2).

Vertical CPI should be effective when the relevant sectoral ministries have a strong climate change mandate, have incentives to internalize it, and have powerful climate change units or departments. However, this is rarely the case so that effectiveness also depends on the level of political will in these ministries (Jordan and Lenschow, 2010). In the absence of these conditions, vertical integration also requires an overarching authority such as a non-sectoral body or agency with governmental mandate to enforce a top-down form of government-led policy integration with ministries reporting back (Nunan et al., 2012). Thus, vertical integration is not just about the devolution of climate policy to sectoral ministries, but includes the presence of a high-ranking institutional mandate and corresponding enforcement mechanisms. While devolving responsibility about CPI to sectoral ministries can increase a sense of 'ownership' and enhance legitimacy, it can reinforce fragmentation and sectoralisation, thus weakening horizontal CPI (Adelle and Russel, 2013).

Mounting evidence suggests that both dimensions of vertical and horizontal policy integration are needed for effective EPI, as well as an institutional mandate for a higher authority (parliamentary or governmental) providing management, monitoring and reporting requirements, and a coordinating body that facilitates joint management between institutions (Jacob and Volkery, 2004; Jänicke and Jörgens, 2006; Nunan et al., 2012). In addition, effectiveness requires the legitimacy – or the political acceptability – of the policy architecture in the eyes of powerful policy actors (Franck, 1990). CPI processes often entail the redefinition of hierarchies and mandates, which are subject to political resistance from interests that feel they might lose out. As such, CPI is determined not just by its policy design, but by the existing political constellation of power (Jacob and Volkery, 2004).

3. Methods

We applied the analytical framework to CPI in the land use sector of Indonesia. The land use sector is central for climate change mitigation in Indonesia as it accounts for sixty-three percent of the country's emissions (Hosonuma et al., 2012). At the same time, the country is extremely vulnerable to the impacts of climate change. As an archipelago prone to natural hazards and with a large population depending on small-scale agriculture, it is at an increased threat from sea level rise and extreme weather events. For example, El Niño events in 1997, 2003, 2006 and 2015 caused droughts which reduced the ability of households to meet their food requirements and contributed to extensive forest fires (Boer and Perdinan, 2008; Siegert et al., 2001). Given the importance of both climate change objectives in the land use sector, taking into account the interactions between mitigation and adaptation becomes crucial to ensure climate policy coherence.

To investigate CPI in Indonesia we explored the two dimensions of policy coherence and policy integration. Starting from the broader features of policy integration, we analyzed the evolution

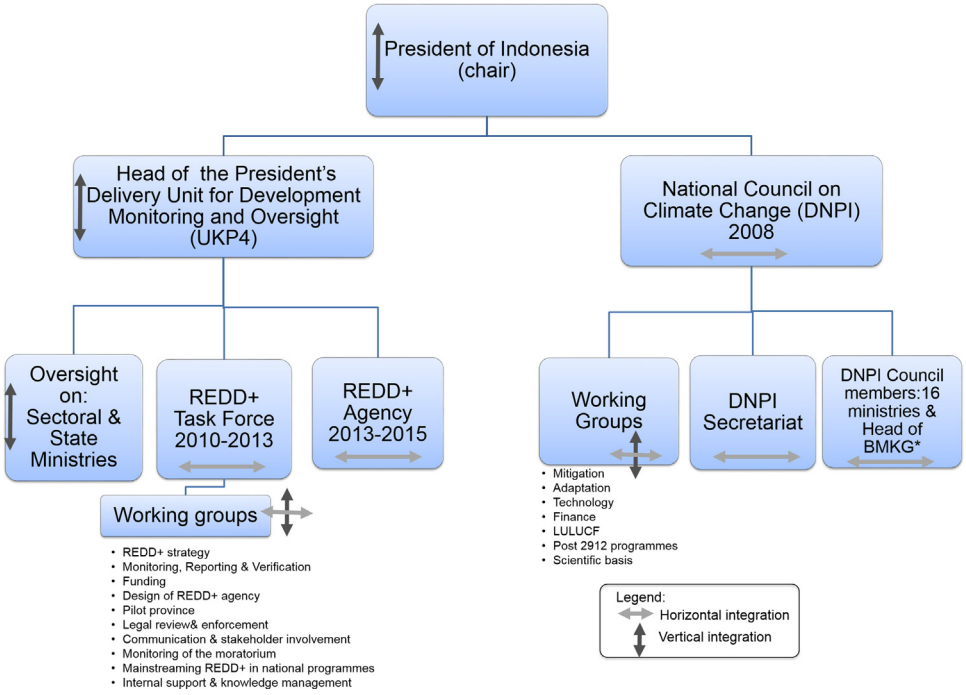

Fig. 1. Climate Change Policy Architecture in the Land Use Sector, 2007–2014.
*: BMKG is the Indonesian Agency for Meteorology, Climatology and Geophysics.

and effectiveness of the vertical and horizontal dimensions of policy integration and assessed whether they facilitate joint approaches to climate change mitigation and adaptation. We focused primarily on the administrative dimension of formal institutional processes and investigated the policy architecture encompassing the key policy actors with a mandate related to climate change in the land use sector, and related multi-actor institutions set in place to formulate and manage climate change policies. Existing literature, official policy documents and 30 interviews undertaken in 2014 and early 2015 with national and international policy actors provided the data for this analysis. The interview material was particularly useful to understand key features of the climate change policy processes (Section 4.1) and was used to triangulate and interpret the results from the policy document analysis (Section 4.2).

We then assessed policy coherence on the basis of the detailed content analysis of 25 major climate change and land use related policy documents (see Appendix A). They included key national level laws, regulations, strategies and plans led by national governmental institutions with a regulatory mandates to devise strategies or plans in the following sectors: climate change, forestry, agriculture, environment and biodiversity and development policies. The analysis sought to identify instances of internal and external climate policy coherence. We identified, analyzed and coded all text passages that discussed positive and negative interactions between mitigation, adaptation and non-climate policy objectives. We used a directed coding approach with an initial list of categories based on a literature review on synergies, and we added new categories as they arose from the documents (Weber, 1990).[1]

We refer to the content and frequency (counts of mentions) of text passages discussing positive and negative interactions between mitigation and adaptation to assess the internal policy coherence in the policy documents. We also identified the sectors and policy domains referred to in the text, and we refer to the text analysis of these passages as well as the frequencies of mentions of sectors to assess the level of concern with external policy coherence. The main sectors identified are agriculture, forestry, energy, environment and biodiversity, disaster management, gender, governance, health, infrastructure, livelihoods, sustainable development, tourism, and water.

4. Evidence from Indonesia

The next sections report the results of the analysis of CPI along the four dimensions of the analytical framework. We first report on the vertical and horizontal dimensions and how they have evolved over time. Next, we present the results of the analysis of internal and external climate policy coherence based on the analysis of policy documents.

4.1. CPI: from limited legitimacy to fragmentation

From the launch of the National Action Plan Addressing Climate Change in 2007 to 2014, the Indonesian climate policy architecture developed important features of vertical and horizontal policy integration. The National Council on Climate Change (DNPI) was formed in 2008 as an inter-ministerial body tasked with horizontal policy integration functions. It had an exclusive climate change mandate and operated under the central leadership of the President of Indonesia. Yet, its mandate also included the facilitation of vertical integration of mitigation and adaptation targets into sectoral and national development policies (Presidential Decree 46/2008). It featured seven working groups – including one on mitigation, one on adaptation and one on land use, land use change and forestry (LULUCF) – with multi-actor and multi-sectoral representation of state and non-state actors (Fig. 1).

Following the pledge of the President of Indonesia in 2009 to reduce carbon emissions by 26% from the business-as-usual baseline by 2020, and up to 41% with international support, a

[1] We coded the documents using NVivo software QSR International Pty Ltd, 2012. NVivo qualitative data analysis software; Version 10.

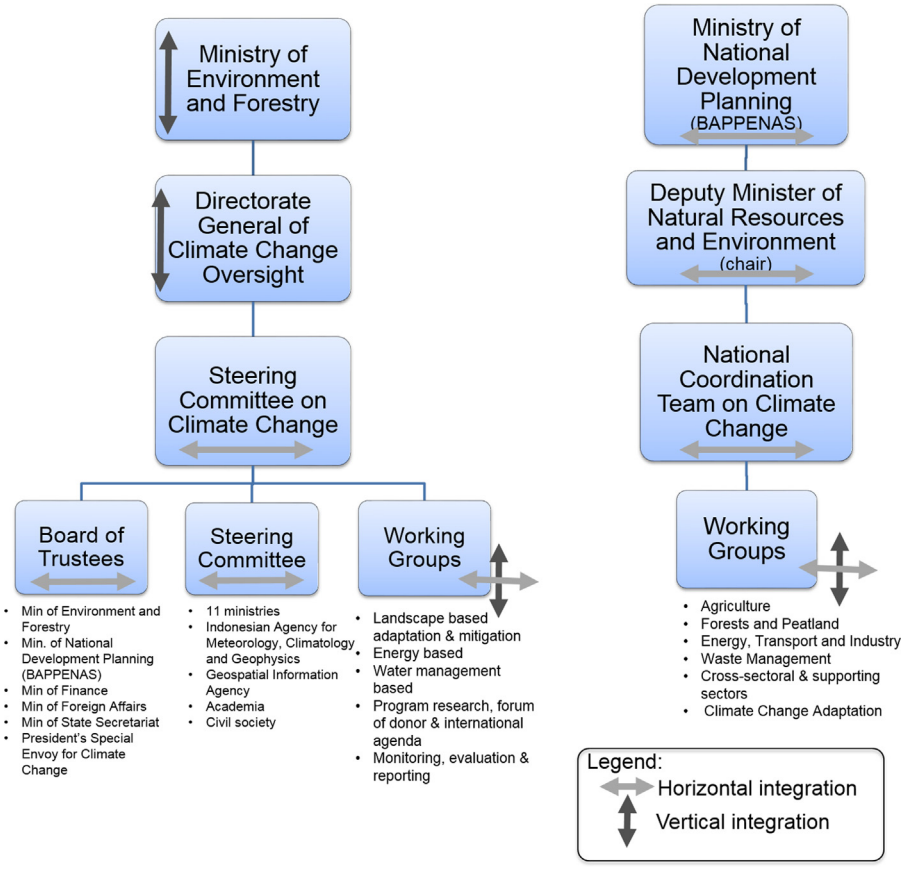

Fig. 2. Climate Change Policy Architecture in the Land Use Sector, 2015.

parallel vertical and horizontal governance structure was established specifically for climate change mitigation in the land use sector. The 2011 Letter of Intent between Norway – a major REDD+ funder – and Indonesia required the establishment of an 'independent' REDD+ Agency (Government of Norway, 2011). A precursor of this agency, the REDD+ Task Force, was mandated to develop the National REDD+ Strategy (Purnomo et al., 2013). The Task Force operated as a unit under the President's Delivery Unit for Development Monitoring and Oversight, known as UKP4. Established in 2009 the UKP4 reported directly to the President of Indonesia and had the mandate to monitor and advise the President on the performance of the cabinet. Through the Task Force, UKP4 supervised the work of ministries in relation to vertical integration of climate change mitigation objectives for REDD+ (personal communication, head of UKP4). The Task Force also contributed to horizontal integration through the 10 REDD+ working groups where different government departments and civil society were represented (Fig. 1). Further climate change units were established in major general and land use related ministries. On paper such a governance structure with clear climate change mandates, reporting mechanisms and oversight structures ensuring both vertical and horizontal dimensions could be expected to perform effectively in mainstreaming climate change mitigation in the land use sector.

However, a major weakness of horizontal policy integration is the resistance it can trigger from sectoral departments reluctant to cede competencies, which can lead to implementation deficit (Collier, 2002; Jacob and Volkery, 2004). The DNPI and the REDD+ Agency did not earn legitimacy in the eyes of key departments such as the Ministry of Forestry, the Ministry of Environment and the Ministry of National Development Planning, who felt disenfranchised from climate policy decisions (Luttrell et al., 2014; McGregor et al., 2015). A number of informants from key ministries expressed such views during the interviews. A complementary explanation is the mismatch between global and national governance regimes, which has led to a form of conflicting fragmentation (Giessen, 2013; Nurrochmat et al., 2014). The fragmentation originates from a typical problem of interplay between governance levels where global interests — the Norway Letter of Intent — dictated a policy architecture that included an 'independent' rule-making institution not reflecting the interests of ministerial level policy actors, weakening legitimacy and compliance with rules.

The Presidential election in 2014 led to changes in the climate policy architecture. The new President, Joko Widodo, dismantled the UKP4, the DNPI and the REDD+ Agency. Some functions of the latter two were incorporated in the newly merged Ministry of Environment and Forestry (MoEF) under the Directorate General of Climate Change Oversight (Widiaryanto, 2015). The MoEF also established a Steering Committee on Climate Change where eleven government departments and some non-state actors are represented. Policy formulation on climate change adaptation has changed too. With the dismantling of the DNPI, the Ministry for National Development Planning (BAPPENAS) appropriated the adaptation agenda. BAPPENAS released the Strategy for Mainstreaming Adaptation into National Development Planning in 2012 and the National Action Plan for Climate Change Adaptation in 2014. Horizontal integration became led by the MoEF and its Steering Committee and by BAPPENAS and its National Coordination Team (Fig. 2). Vertical integration was solely in the hands of sectoral ministries.

The 2014 changes to the climate policy architecture improved its legitimacy in the eyes of powerful government departments. However, it came at the cost of weakening of vertical and

horizontal policy integration (see Appendix B for a summary table of key indicators). The dismantling of the main climate change agencies, the UKP4 and the change in the Presidency dismantled the institutional structure monitoring and enforcing vertical integration. This left a vacuum in the central government on the importance of addressing climate change within the land use sector, as control moved down to the bureaucratic system and fragmented across various ministries. The dismantling of the overarching institutional mandate on climate change equates to a loss of authority to regulate, monitor, assess and sanction, which is detrimental for policy integration (Jenkins, 1978; Jordan, 2002; Mickwitz et al., 2009; Oberthür, 2009). Moreover, the responsibilities for horizontal policy integration became blurred with unclear distinction in the mandates of the MoEF's and BAPPENAS's multi-stakeholder bodies (personal communication, NGO representative) (Fig. 2).

However, the new climate policy architecture has potential for improved internal policy coherence. Under the DNPI there were distinct climate change working groups for mitigation and adaptation, but now the MoEF and BAPPENAS sectoral working groups have the potential to facilitate policy discussions and decisions that consider sectoral mitigation and adaptation objectives simultaneously. But in practice, the MoEF leads on climate change mitigation and BAPPENAS leads on climate change adaptation (personal communication, civil servants from the two ministries). Therefore, it will be important that these two ministries both explicitly consider internal climate policy coherence in their respective domains and that they work closely together.

4.2. Internal and external climate policy coherence

In what follows, we examine the references (text passages) discussing different types of positive and negative interactions in the policy documents, their frequency and the sectors they refer to. In the 134 references to positive interactions, integrated approaches are mentioned 45 times, 36 of which are associated with a specific sector. Most of these references relate to agriculture, followed by forestry. Two-thirds of the references are contained in only three policy documents: the Strategy for Mainstreaming Adaptation into National Development Planning (11 references); the National Action Plan Addressing Climate Change (9 references); and the National Action Plan for Climate Change Adaptation (8 references). In fact, the Strategic Plan is the only policy document that dedicates a whole section to synergies and trade-offs between mitigation and adaptation (BAPPENAS, 2012, section 2.3, p.18). References to adaptation actions that have co-benefits for mitigation (A → +M) or for non-climate policy objectives (A → +O) are at least twice as frequent than those referring to co-benefits from mitigation (respectively M → +A and M → +O) (Fig. 3).

The vast majority of co-benefits from adaptation to mitigation refer to the forestry sector and they are discussed primarily in the National Action Plan for Climate Change Adaptation. The co-benefits from mitigation to adaptation in turn refer primarily to the agricultural sector, followed by the water and forestry sectors. This is somewhat unexpected: adaptation measures could have been expected to refer primarily to agriculture and mitigation to forestry, because agriculture is highly climate-dependent and forests store large amount of carbon. There is a clear effort among leading adaptation actors, such as BAPPENAS, to highlight the benefits from considering adaptation in forest conservation. This is a tactic to draw attention to the role of adaptation in REDD+ measures. In a country highly vulnerable to climate change, but where funds and policy agendas focus on mitigation actions and REDD+, the argument that "mitigation activities need adaptation"

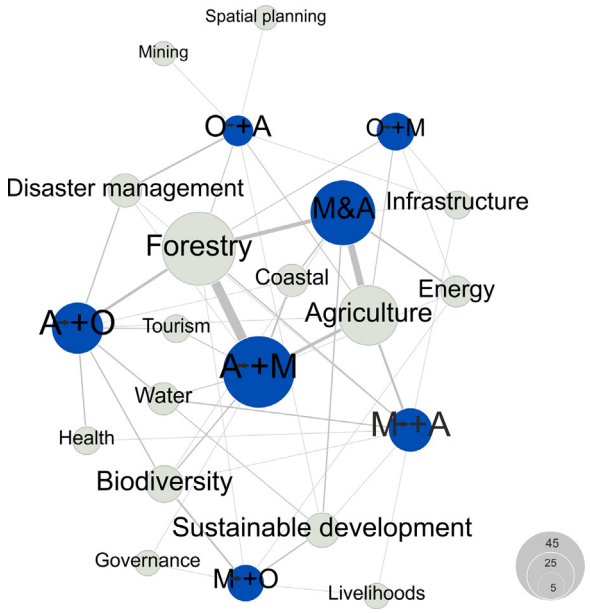

Fig. 3. References to positive interactions between mitigation, adaptation and other non-climate policy objectives by sector (dark nodes are type of positive interactions, light nodes are sectors, node size reflects the number of references, and the width of ties reflects the number of joint references to interactions and sectors). The meaning of the symbols in the dark nodes is explained in Table 1.

(BAPPENAS, 2012, p. 24) is a compelling one. Thus, it is not so surprising that the strongest calls for integrated approaches come from the climate change adaptation camp.

There is much more limited discussion on negative interactions or trade-offs in the policy documents (only 34 references). Trade-offs are mentioned in only 4 of the 25 policy documents. Two thirds of the references occur in the Strategy for Mainstreaming Adaptation into National Development Planning and seven of them can be found from the National REDD+ Strategy. The majority of identified trade-offs originate from mitigation actions (M → −A and M → −O) and primarily affect forestry and energy sectors and to a lesser extent agriculture and livelihoods. There are only five references to potential negative impacts from adaptation to mitigation and they refer to the water and infrastructure sectors (Fig. 4).

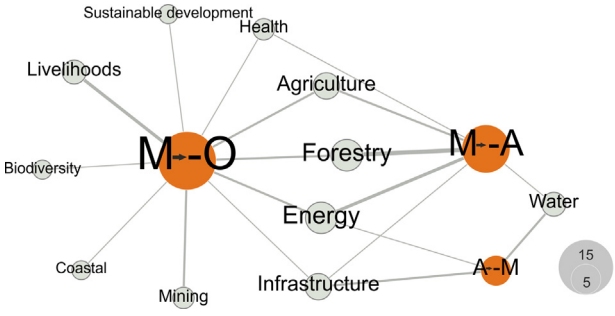

Fig. 4. References to negative interactions between mitigation, adaptation and other non-climate policy objectives by sector (dark nodes are negative interactions, light nodes are sectors, node size reflects the number of references of interactions and sectors respectively, the width of ties reflects the number of joint references of interactions and sectors). The meaning of the symbols in the dark nodes is explained in Table 1.

4.3. Mainstreaming climate change into development plans

We identified all explicit references to the mainstreaming of climate change into development policies. Only the main adaptation (48 references) and general climate change policies (14 references) really address the need to mainstream climate change into development. Climate change mitigation policies pay much less attention to mainstreaming (5 references). Neither the greenhouse gas emission reduction policy nor the plans to develop REDD+ elaborate in any detail on climate change-development linkages. Most notably, the three most important development policy documents mention mainstreaming of climate change only once and in very general terms (BAPPENAS, 2010, p.32). The 2010 Presidential Regulation on the National Medium Term Development Plan briefly refers to climate change mitigation targets as well as the need to address adaptation to ensure food security and to strengthen natural disaster management. Yet, the Masterplan on the Acceleration and Expansion of Indonesia Economic Development 2011–2025 (MP3EI) highlights economic growth targets, such as the expansion of palm oil and forest plantations and mining in Kalimantan, as opposed to climate change measures. The only reference to a climate change impact is to the effect of drought on rice production, without discussion of any adaptation measures. There are no references to potential trade-offs in any of the development plans. Thus, while there is a Strategy for Mainstreaming Adaptation into Development Planning and mainstreaming is mentioned in both climate change and adaptation policies, in practice climate change objectives have not been integrated in any detail in any of the major development planning documents.

5. Discussion

Based on evidence from the climate change and development literature this article has argued that effective CPI in the land use sector does not just need to ensure the mainstreaming of general climate change objectives into sectoral policies, but also the alignment of climate change mitigation and adaptation objectives with each other and their simultaneous consideration (Locatelli et al., 2015; Ravindranath, 2007). The article re-conceptualizes CPI accordingly and refines the meaning of internal and external CPI in order to explicitly include the analysis of positive and negative interactions between the two climate objectives. This framework can guide future studies on CPI in policy domain where these interactions are important. To date few studies have investigated country level evidence on internal CPI (Duguma et al., 2014; Somorin et al., 2016).

Our evidence indicates that in Indonesia only a few adaptation and general climate change policies acknowledge synergies between mitigation and adaptation. Moreover, integrated approaches to climate change have not comprehensively been mainstreamed into development planning and sectoral policies. Most efforts to foster integration have been made by the adaptation camp under the framing that 'mitigation needs adaptation' (Guariguata et al., 2008). Yet, mitigation policies largely ignore positive and negative linkages with adaptation. This neglect could undermine the success of mitigation projects and increase conflicts (Dunlop and Corbera, 2016; Olander et al., 2012). It is also against the REDD+ safeguards specified in the Cancun agreements, which require consistency between mitigation and adaptation needs. Policies that refer to trade-offs between mitigation and development suggest that development objectives should take precedent over climate change objectives, which in the absence of strong political will could jeopardize climate action. This is a common challenge in CPI (Adelle and Russel, 2013). More broadly, omission of consideration of co-benefits and trade-offs between the two climate change objectives will hamper attempts to design and implement climate compatible forms of development (Denton et al., 2014; Stringer et al., 2014).

Our findings also corroborate existing evidence that vertical and horizontal policy integration are best understood as complementary strategies as opposed to alternatives and that they often require an overarching governance structure under the lead of a governmental authority that manages and monitors policy integration processes (Jacob and Volkery, 2004; Jänicke and Jörgens, 2006; Nunan et al., 2012; Oberthür, 2009). Yet, in Indonesia the constellation of power and the interests of key ministries to maintain sectoral control and to appropriate the climate agenda led to the dismantling of the oversight structure, fragmentation of climate change responsibilities across sectors and departments and weakening of policy integration. This confirms that effective policy integration, including the presence of all four dimensions of our conceptual framework, ultimately depends on the constellation of power of policy actors (Collier, 2002; Dalal-Clayton and Bass, 2009).

6. Conclusion

This article contributes a revised conceptualization of CPI in the land use sector to highlight the need to assess the level of integration of mitigation and adaptation objectives and policies in order to minimize trade-offs and to exploit synergies. It suggests that effective CPI in the land use sector requires i) internal climate policy coherence between mitigation and adaptation objectives; ii) external climate policy coherence between climate change and development objectives; iii) vertical policy integration in the form of governance structures that facilitate mainstreaming of climate change into sectoral policies and; iv) horizontal policy integration by overarching governance structures for cross-sectoral coordination.

We argue that the above four characteristics are all necessary to develop a policy environment that facilitates climate resilient land use pathways combining the aims of climate change adaptation, mitigation and sustainable development. We have shown that the analysis of these four characteristics in specific country contexts can help to disentangle and identify different climate policy architectures, detect their strengths and weaknesses and assess how they evolve over time. However, the composition of interests of the actors in sectoral policy domains shapes and can constrain CPI. In Indonesia, the absence of a strong overarching governance structure for climate change policy integration will pose a major challenge for key ministries, challenges to effectively collaborate, integrate and manage multiple climate and development objectives and to coordinate conflicts of power among competing sectoral interests.

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Appendices A and B. Supplementary data

Supplementary data associated with this article can be found, in the online version, at http://dx.doi.org/10.1016/j.envsci.2016.11.004.

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