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Intergenerational Responsibility.
Historical Emissions and Climate Change Adaptation.

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Abstract

It is widely held that climate change requires that we engage in strategies of adaptation as well as mitigation, but the normative questions surrounding justice in adaptation remains insufficiently investigated. This paper asks, from a presumption that climate change adaptation presents burdens which needs to be fairly distributed between states, what a fair way of allocating remedial responsibility for adaptation would look like. A number of principles are analyzed, some of which attach normative weight to causal contribution to the problem and others not. The conclusion is that none of the suggestions prevalent in the literature is without profound problems, but a promising path for the future is to construct pluralistic models of justice which are sensitive to both a state's level of pollution and its ability to pay. The paper ends, however, by predicting that while adaptation from a normative standpoint is an other-regarding duty, actual future adaptations regimes are likely to be market-based. Particularly likely is an insurance-based regime, according to which each state is expected to fend for its own protection.

Keywords: adaptation; mitigation; climate change; justice; causal responsibility; remedial responsibility; polluter pays principle; the ability to pay principle; insurance

1. Introduction

This paper addresses the question of fair climate change adaptation. Adaptation, the strategy of leaning to cope with the ill-effects of climate change, poses questions of justice that are distinct from, and no less difficult than, those of mitigation.¹ Adaptation gives birth to two separate questions: (1) how adaptation resources are to be distributed, and (2) how adaptation resources are to be raised. Throughout, we assume that adaptation should be distributed according to vulnerability, and instead focus on the latter question. How should obligations to contribute to adaptation funds be allocated? This, we argue, is fundamentally a question of responsibility, and one which remains far from satisfactorily answered. To assign responsibility is inherently more difficult in problems such as climate change, since responsibility need to be analysed in global and intergenerational terms. The ill-effects of climate change involves trans-temporal and border crossing asymmetries. Later generations will be impacted by the actions of prior generations. Those who pollute most need not be those who suffer most from the effects of climate change. And so forth.

We outline a set of climate change adaptation models, which differ in terms of the way they allocate responsibility. These models are tested in terms of their normative appeal. This is to say that we do not, as a rule, consider the feasibility of the models. Instead, we run the models against considered moral judgements, and try to assess the extent to which each model leads to implications that seem problematic. As will become obvious, this is a pluralist approach, and one which is quite explorative. We do not run the models against explicit preconceived principles or criteria, but argue the flaws and merits of each model as we go along. The conclusion is that while all of the models have problems, there is some merit to recent attempts to combine principles of historical responsibility with those of ability to help others adapt. We end, however, by speculating that a likely future adaptation regime, which to a large extent disregards social justice, is one which is founded on a market based insurance system where each state will be expected to take responsibility for its own protection.

2. Climate Change Adaptation

The dangers associated with climate change call for a broad spectrum of policy responses and innovative strategies at the individual, local, national and international level. The UNFCCC (United Nations Framework Convention on Climate Change) highlight two fundamental response strategies: *mitigation* and *adaptation*. Mitigation means to limit (human induced) climate change by reducing the emissions of GHG (greenhouse gases), by enhancing ‘sink’ opportunities, e.g., by planting trees and through sequestration. *Adaptation*, on the other hand, aims to alleviate the adverse impacts of climate change. Thus, adaptive capacity is defined as “the potential or capability of a system to adjust to climate change, including climate variability and extremes, to moderate potential damages, to take advantage of opportunities, or to cope with consequences” (Smit & Pilifosova 2001). Since it is assumed that there will be a wide range of effects connected to climate change, e.g., unstable weather such as flooding, drought, hurricanes, spreading of diseases, sea-level increases, and consequently

¹ We offer a validation of this claim in (Jagers & Duus-Otterström 2007)

demographic changes, adaptation as activity refer to a multiplicity of actions, often with rather local uniqueness (Fussel & Klein 2002).

Although both mitigation and adaptation measures need to be pursued in order to cope with climate change – not to speak of, to create an effective and inclusive international regime – most of hitherto attention has been devoted to mitigation, both within the sciences and in the policy debate (TERI 2006; Burton, Diringer & Smith 2006). The sensitivity to adaptation issues has, however, grown during the last few years, especially following the IPCC's (Intergovernmental Panel on Climate Change) Third Assessment Report (TAR). And there are good reasons for this, we believe. No matter how efficient and robust mitigation measures are or will be, a certain degree of climate change seems inevitable due to historical emissions and their inertial effect on the climate system (IPCC 2001). Thus, the effects of mitigation may take many decades before being fully manifested in terms of a stabilised climate (if that is at all plausible), or at least a stable global average temperature. Awaiting such stabilisation, adaptation measures will be needed to alleviate problems caused by climate change.²

Also, while the mitigation strategy is motivationally dependent upon the claim that current and future climate change is *human induced*, adaptation measures can be justified regardless of whether climate change is caused by humanity or natural climate variation. Thus, even if some still doubt the extent to which climate change is caused by humans, this doubt cannot in itself be raised as an argument against the duty to alleviate the effects of climate change as such.

While the international debate on adaptation is very much needed, it is also quite understandable that it has gained less attention in the present negotiations. It really *is* a difficult matter. Almost by definition adaptation must vary across both geographical scales (i.e., from individual/local up to international level) and temporal scales (both coping with current impact and preparing for long-term effects). In addition, the idea of adaptation covers highly complex and still rather uncertain conditions: To a large extent we still do not know when, where and what will happen with the climate when the global temperature is increasing. Nor do we know when or at what GHG concentrations the temperature increase will peak and we can expect the climate to become less unpredictable (TERI 2006).³

These uncertainties and complexities are, however, not the only reason why adaptation has been kept a Cinderella in the international climate negotiations. For example, after been agreed upon at the COP-meeting in Marrakesh in 2001, there are now three different international funds designed to collect capital to cover the costs for adaptation projects, mainly in countries particularly vulnerable

² A similar point has been made by Gardiner, who argues that, "adaptation measures will clearly need to be part of any sensible climate policy, since because we are already committed to some warming due to past emissions, and almost all of the proposed abatement strategies envisage that overall global emissions will continue to rise for at least the next few decades, committing us to even more" (Gardiner 2004: 573). In his excellent survey of ethical questions posed by climate change, Gardiner does not seem to think that adaptation poses normatively distinct questions, however, which we will argue in this paper.

³ This is not say that the world will go from one stable climatic equilibrium to another. To the contrary, most experts agree that, regardless of a future new temperature equilibrium, the future climate will nevertheless be much more uncertain and unpredictable than in the past (Burton, Diringer & Smith 2006).

and least capable to finance the projects by themselves.⁴ These funds are plagued by a number of problems. The first Fund, the Kyoto Protocol's Adaptation Fund (AF) is primarily supposed to be replenished through a two percent levy on the Kyoto Protocol Clean Development Mechanism. Although officially already set in action, many formal issues remain before the fund is fully functioning, e.g., it is still unclear who is actually qualified to apply from the fund and, not least important, who should manage it. The second fund, the Least Developed Country Fund (LDC) is supposed to support at least 49 such countries in their designing of national adaptation programmes of action. Finally there is the Special Climate Change Fund (SCCF) which is aimed to support a variety of adaptation initiatives, e.g., technology transfer, transport, industry, natural resources and waste management – i.e., largely to assist developing countries in diversifying their economies. While it is decided that the latter two funds are operated by GEF (Global Environmental Facility) under the umbrella of UN, and while the funds are already operational, at least one important remaining problem with both funds is that they are based upon voluntary contributions. Thus, the question “*who should pay?*” is not founded in any international agreements but remains each country's discretion (Huq & Burton 2003).

A very straightforward reason why the question of adaptation has been largely avoided in prior negotiations is that adaptation is costly (Burton, Diringer & Smith 2006). For example, with the present size and development of AF, which has been estimated by the World Bank to amount to between \$270 to \$600 million by 2012, the global community is far from covering the expected *annual* developing countries adaptation costs of between \$9 and \$41 billion (Muller 2006). Thus, for the other two funds to cover the annual costs, the donor countries must leave *significant* voluntary contributions.

3. Fair Adaptation to Climate Change

Many problems of more practical-political and institutional nature thus plague present attempts to adapt to climate change. But even those practicalities aside, the more fundamental question of *fair adaptation* remains insufficiently examined. While most ethical work on climate change has either addressed mitigation exclusively (Adger, Paavola & Huq 2006), or seen mitigation and adaptation as strategies that raise the same moral problems (cf. Caney 2005), this paper argues that adaptation does give birth to some problems that seem separate from (and no less difficult than) those of mitigation.⁵ This paper is devoted to furthering the discussion of what would be a fair way of adapting to global climate change.

⁴While the greatest losses, in absolute terms, occur in the industrialised world, when measured in relation to wealth, losses from extreme weather events are much higher in developing countries.

⁵ An example of a theorist who treat mitigation and adaptation jointly is Simon Caney. In a recent article about climate change and responsibility, he writes: “I shall not explore the difficult question of how much we should seek to mitigate and how much we should seek to adapt. This is, of course, a key question when determining what specific concrete policies should be implemented. It is also the subject of some controversy. However, I wish to set that practical issue aside and simply focus on the more abstract question of who is morally responsible for bearing the burdens caused by climate change” (Caney 2005: 752). It is noteworthy that Caney here considers the question of mitigation vs. adaptation as a *practical* issue.

In what way does adaptation raise separate normative problems?⁶ Paavola & Adger (2006) has treated this question, arguing the need to hold adaptation and mitigation separate. Adaptation, they claim, “presents formidable dilemmas of justice to the international community, ones which are more complex and no less important to those presented by mitigation” (ibid. 594). The reason why adaptation is (more) complex is built upon two cornerstones. First, anthropogenic climate change is caused by GHGs emitted by developed countries, while the consequences of climate change will disproportionately burden developing countries. In addition, however, “while climate change impacts are often presented and projected at the global, continental or national level, they are ultimately felt at the local level” (Ibid. 594). From a distributive point of view, Paavola & Adger continues, this is a major problem since communities suffering from climate change impact have different vulnerability within each country (Burton, Diringer & Smith 2006). Also, the most vulnerable people often have the least say (cf. Light & de-shalit 2003; Schlosberg 2002: 12-4). Paavola and Adger’s reasoning lead them to conclude that adaptation presents a number of justice dilemmas, including (a) what is the responsibility of developed countries for climate change impact?, (b) how much should developed countries give assistance to developing countries for adapting to climate change and how should the burdens be distributed among the developed countries?, (c) how should assistance be distributed between recipient countries and adaptation measures? And finally, (d) what procedures are fair in planning and making decisions on adaptation (Ibid. 595)?

Though we support Paavola & Adger’s point of departure, we believe that the normative characteristics of adaptation can be further developed: The question about responsibility and the burden sharing dilemma of adaptation is perhaps more challenging than suggested by the two. Because, apart from the obviously asymmetrical relationship between who causes and who suffer from climate change, factors such as uncertainty and halving time of the GHGs add to the difficulties that need to be dealt with when assigning responsibility.

First, to a large extent, the *resilience* of the climate system is uncertain. This uncertainty comprises what, when and where will happen when the global temperature is increasing (Schneider & Lane 2006). Nor do we know when or at what GHG concentrations the temperature increase will peak, and after which we can (hopefully) expect the climate to stabilize or at least become less unpredictable. This *uncertainty* is problematic from a responsibility point of view. Provided that we support the human induced climate change theory, there is no such uncertainty regarding the (long-term) *positive* effects of mitigation, nor any uncertainty that the action taken will have desirable effects. Regarding adaptation the situation is different. What can be demanded of those potentially responsible or morally obliged to finance adaptation projects? How certain does one – not to speak of those presumably responsible for it - need to be before one is willing to chip in? In fact, this uncertainty may force adaptation to turn into *compensation* rather than assistance (not to mention prevention) (Linnerooth-Bayer & Vári 2006).

Second, while mitigation should be considered a common good - or perhaps better put: a strategy producing a good for (the vast majority)⁷ of the global community - adaptation is obviously a *particular good* only benefiting those in need of, or dependent upon, what the adaptation strategy is targeting. Reasonably, this characteristic of adaptation will have consequences when successfully

⁶ Again, we have offered a fuller validation of the principled differences elsewhere. See footnote 1.

⁷ Climate change may turn out to be beneficial for some areas, e.g., currently dry regions predicted to receive more precipitation.

theorising about who is responsible and who should pay. Is it, e.g., those who are responsible for climate change who can afford?, or perhaps even those who, without adaptation efforts, will otherwise suffer, and this regardless of economic strength?

Third, the halving times of many greenhouse gases⁸ is yet another reason why adaptation is more problematic than mitigation when it comes to responsibility and who should take the burdens for it. No matter how robust mitigation measures are, *a certain degree of climate change is inevitable due to historical emissions and the inertia of the climate system* (IPCC 2001). This also means that irrespective of how successful societies are in mitigating climate change, the future may hold unexpected and harmful events - the responsible for which may no longer be alive. Thus, the normative story of climate change does not end with effective mitigation.

Given the complexity of adaptation, it is no surprise that normative theorising on the subject is still more or less in its infancy. The aforementioned paper – Paavola and Adger’s authoritative statement on fair adaptation to climate change – omits some key issues. In particular, it leaves unspecified the guiding principle according to which allocations of burdens should be distributed.⁹ Plausible as Paavola and Adger’s reasoning is at a general level, it does not sufficiently examine the nature of the desirables in their theory, nor the various ways in which they can compete and conflict with each other. In particular, their crucial second principle – the principle of forward-looking responsibility – needs to be further examined.¹⁰ Paavola and Adger claim that a uniform carbon tax, which befalls states that exceed their per capita quota, would be fair (and also make sure that economic and environmental interests overlap). Leaving the beneficial consequences of such a tax aside for now, the normative principle underlying it, which seems to be some variety of the polluter pays principle, is plagued by many problems that need to be addressed.¹¹ There are certainly many alternative ways of determining contributions to adaptation funds to a uniform carbon tax, and this paper is devoted to presenting and analysing some of them – going into some detail about exactly how and why obligations to contribute to adaptation should be assigned¹²

⁸ E.g., the halving time for carbon dioxide is approximately 140 years.

⁹ Paavola and Adger (2006) advance four normative principles, which they take to be key for fair adaptation. First, the principle of avoiding dangerous climate change – which is, plausibly enough, the principle that GHG emissions should be kept at level that “does not surpass the capacity of natural systems, food production systems and economic systems to adapt” (p. 602). Second, the principle of forward-looking responsibility, which states the action needed to keep emissions at or below the safety level. Paavola and Adger argue that a uniform carbon tax could ensure this. The tax revenue would then be used to finance adaptation. Third, the principle of putting the most vulnerable first. “This rule would call for assisting the most vulnerable group first and moving then up in the vulnerability ladder” (p. 605). This is a “leximin rule”. Vulnerability, excellently treated by Paavola and Adger, is understood as a function of *exposure*, *sensitivity* and *adaptive capacity*. It follows that Haiti and Florida should not be seen as equally vulnerable, although both run fairly even risks of hurricanes. Fourth, the principle of equal participation for all. Paavola and Adger here argue that a fair adaptation regime would need to be procedurally fair and not only distributively fair. This is not least important, since different communities may have different standards of risk, need, etc., and should have a voice in the decision making process.

¹⁰ We of course agree that emissions should be kept at or below a safety level (a question of mitigation, it seems); that resources should be distributed according to vulnerability; and that decision making processes should be inclusive and fair. (We shall not, however, have the time to address questions of procedural justice).

¹¹ Note also, on the prudential side, that we might have a situation where all states stay below the per capita quota but where adaptation is still required, because of the inertia of climate change.

¹² Some could object on normative grounds, however, to the very idea of adaptation. For to adapt means to cope with a problem, rather than stopping the problem in the first place. This, one may object, might seem like a strategy of resignation - more reactive than preventive. This objection would be sound only to the extent that adaptation is the *only* strategy pursued, however. We do not wish to argue this, nor would (we hope) anyone

3.1 A state-centred approach

A crucial issue for theorists of climate change regards the basic level of analysis. When one speaks of such-and-such agents having such-and-such obligations, what is then referred to? A rough distinction can be made between approaches that are *individual-centred* and analyse harms, burdens, etc. in terms of individuals, and those who are *state-centred* and analyse harms, burdens etc. in terms of unitary states.¹³ The choice between the two approaches involves the difficult question of collective responsibility – whether it can make sense to regard a compound entity such as a state as a collectively responsible agent.¹⁴ The choice between the approaches has also substantive ramifications for the question of justice.¹⁵ In this paper we take a state-centred approach. We assume that the basic bearers of responsibility are states. There are many difficulties involved in making this assumption, and we certainly do not wish to suggest that there are adequate responses to all of them. But taking an individualist-centred approach complicates matters – complicates them more than what this paper can handle.¹⁶ Furthermore, it is reasonable to assume that the contributors to adaptation funds will be states. Even though the costs in the end fall on individuals, it is nevertheless appropriate to consider obligations to contribute to adaptation as obligations of states.

So, given that we treat states as the basic level of analysis, what can be said about the backdrop against which the question of fair adaptation is addressed? Without anticipating the forthcoming sections, this much can be established already here: *It appears that those most vulnerable to climate change are the ones least causally responsible for it and also the ones least able to pay.* Thus, it is reasonable to assume that any local, national and international adaptation efforts - regardless of form and regardless of being understood as prevention, assistance or compensation - will be adequate only insofar as affluent countries, i.e., surplus economies, are willing to set aside resources for such projects. The question of if and how such redistribution can be fair is what animates much work on climate change, and is certainly what animates this paper.

4. Adaptation, Responsibility and Future Generations

The normative questions posed by climate change are often framed as questions of *responsibility* (Gardiner 2004; Caney 2005). This makes sense. The concept of responsibility has a built in ambiguity which captures nicely the justice-based concerns of climate change. When we say that some state of affairs *X* is your responsibility, we can namely mean roughly two separate things. On the one hand we may intend that the occurrence of *X* in some particular way is attributable to you:

else. A sensible climate change regime should rest on both adaptation and mitigation. As we have already argued, even if we in the near future manage to reduce emissions dramatically, the inertia of climate change means that we still need to take adaptive action. Note also that much adaptive action *is* preventive rather than reactive; see e.g. (Paavola & Adger 2006).

¹³ Note that this is not an exhaustive distinction. Other suggested levels of analysis, in terms of responsibility, are *nations* (Miller 2004), *corporations* (May 1992; Pettit 2007), and even *random groups* (Held 1970).

¹⁴ For a forceful criticism of the notion of collective responsibility, see (Narveson 2002).

¹⁵ As we will see, a state-centred approach sidesteps one of the more devilish problems associated with intergenerational justice: the non-identity problem, see (Page 1999).

¹⁶ Apart from inviting the non-identity problem, an individualist approach raises complicated questions about the internal political situation in a state. For instance, it raises the question whether a state that discriminates a particular minority in need of adaptive resources should be granted assistance, given that the state *might* put the resources to ill use.

that you are responsible for *X* since your actions, omissions, etc., are such that you in some way have caused or produced *X*. Responsibility in this sense is *backward-looking*. Its fundamental question is “Who has caused the occurrence of *X*”, or, assuming that *X* is something bad, “Who, (if any) is to blame for *X*?”. On the other hand, by saying that *X* is your responsibility we may also mean that you in some way have an obligation, or at least is strongly expected to, act so as to correct or counter the effects of *X* in various ways (for instance by helping those who suffer from *X*). Responsibility in this sense is *forward-looking*. Its fundamental question is “Who should do something about *X*?”.

The distinction between backward-looking and forward-looking responsibility is widely accepted among theorists. Backward-looking responsibility in turn is sometimes elaborated so as to account for differences between *causal*, *outcome* and *moral* responsibility.¹⁷ For the purposes of this paper, we shall settle for the term *causal* responsibility. Causal responsibility here simply stands for causal contribution – an agent (or non-agent) is causally responsible for *X* if the agent singularly or in combination with others have caused *X* to occur, and causally responsible to a degree that corresponds with the degree of causal influence. To be sure, it will sometimes be appropriate to introduce considerations exclusive to moral responsibility – one key question with respects to historical (causal) responsibility for emissions of GHGs is whether it makes a difference that prior generations were ignorant of the consequences of such emissions – but for the most part we shall use the term causal responsibility, indicating when we use other varieties of backward-looking responsibility.

Forward-looking responsibility of the kind which concerns who should correct or counter *X* or the effects of *X* is perhaps more straightforward. An agent has this kind of responsibility if he or she has a moral obligation, or at least a weighty moral reason, to in various ways correct or counter *X*. Theorists have employed various terms to denote this kind of responsibility, however.¹⁸ Miller prefers to refer to the concept as *remedial* responsibility, which is the term we will use.¹⁹ We may debate the moral weight of being remedially responsible. Some seem to assume that being remedially responsible equals being under a perfect duty to take action, whereas others seem to think that it presents a reason, but perhaps not a conclusive one, to do so. On any account, however, being remedially responsible means something stronger than “would be nice”. Responsibilities are not optional in this way.

¹⁷ In Miller’s version the difference between *causal* and *outcome* responsibility is that the latter do not extend to outcomes that “arise in bizarre and unpredictable ways” (Miller 2004: 245). Although our causal contribution is necessary (and perhaps sufficient) for the outcome in such cases, Miller argues that we are not outcome responsible for them since we lack the kind of fundamental control required in order for the outcome to be appropriately attributed to us. Outcome responsibility differ from *moral* responsibility, furthermore, in that the latter concerns moral assessment (such as whether an agent is blameworthy) whereas the former need not. One can thus be outcome responsible even if one is without moral responsibility, such as under conditions of strict liability. If we are outcome responsible for a harm, we may be required to compensate others even though we may not be *at fault* for the harm occurring.

¹⁸ Iyengar prefers to refer to it as *treatment* responsibility (Iyengar 1988). Goodin has developed a closely related notion of *task* responsibility (Goodin 1985; 1995). It is important to note that this kind of responsibility is often conferred on an agent *precisely because of* the agent’s institutional role or position. It is the remedial responsibility of the health system, for instance, to cure people of various diseases. However, many instances of remedial responsibility are defined by their *lack* of institutionally assigned caretakers. We may for instance have a duty to intervene in a failing state, despite the lack of formal mandate to do so.

¹⁹ Miller writes: “The idea of remedial responsibility comes into play when we consider a person or group who are suffering harm of some kind, and we want to identify an agent whose job it is to put that situation right: we say that the agent in question has a remedial responsibility to end the suffering” (Miller 2004: 247).

Causal and remedial responsibility clearly captures most of the problems of justice associated with climate change: both questions of causal contributions to the occurrence of climate change (human-induced or not) and questions of who should be taken to have an obligation to correct or counter the effects of climate change.²⁰ It is important to note that causal and remedial responsibility are logically independent of one another. One may be causally responsible without being remedially responsible, and vice versa. A basic analytical framework of responsibility is thus to ask, for any given agent, whether or not they are causally responsible and remedially responsible, respectively. Assuming for simplicity that answers are dichotomous, we get a four-placed outcome table:

		REMEDIAL RESPONSIBILITY	
		NO	YES
CAUSAL RESPONSIBILITY	NO	(a)	(b)
	YES	(c)	(d)

Comment. Whereas causal and remedial responsibility are treated as dichotomous variables here, both kinds of responsibility come in degrees. It is plausible that all states share causal responsibility for the occurrence of climate change, but they do so to vastly different extent. Some cut-off point should therefore be postulated below which a state cannot plausibly be said to be causally responsible (we do not provide such a postulation here, however). Above this cut-off point, causal responsibility comes in degrees. Remedial responsibility also comes in degrees, but there is no need to introduce a cut-off point with respects to this concept.

This basic table will have some importance later when we consider various principles of adaptation, which in essence consist in different ways to occupy the four positions. It is important to note, however, that the table is only an analytical tool, and not a means of drawing conclusions. We would not say, at this point, that a model is better or worse depending on the different boxes it occupies.²¹

A prevalent view is that causal and remedial responsibility should interconnect in a particular way. A strong intuition of justice namely holds that it is those who are causally responsible for a problem that have an obligation to correct or counter the problem – that it is unfair if agents are burdened for things for which they have no causal responsibility.²² Within the context of climate change, the polluter pays principle (PPP) is an expression of this view. But to make remedial responsibility depend on causal responsibility is a substantive and contestable view, and not one that all accept (see e.g. Young 2006).

²⁰ If, against all reasonable guesses, it turns out that climate change is exclusively a result of natural variation, the causal responsibility in question would befall “nature” – surely not something which can be held to standards of behaviour and which we can blame or otherwise hold accountable. However, even if all responsibility-capable agents are without causal responsibility for climate change, it does *not* follow that all are without remedial responsibility for correcting or countering its effects.

²¹ That is, we would not say that e.g. a model which enables all four positions is better than one which only occupies, for instance, (a) and (d). Such a position is a substantive claim, which needs a separate justification. At this point, then, we remain agnostic about what relations between causal and remedial responsibility is to be preferred.

²² This is a cornerstone in luck egalitarian thought, for instance. For critical surveys of luck egalitarian ideas, see (Anderson 1999; Scheffler 2005).

The most daunting aspect of climate change, in particular with respects to responsibility, has to do with the fact that it raises questions of *intergenerational* justice, in two ways.²³ Firstly, it is today agreed that coming generations are as worthy of consideration and respect (if not *equal* consideration and respect) as present generations. Thus, what we do today must affect future generations in an acceptable way: we cannot squander the climate just because doing so might be in *our* immediate interest. Secondly, and more to the point, climate change is a process that takes place across generations. What an agent emits at one time has consequences at a (much) later time. Thus, we are now beginning to suffer from emissions (arbitrarily) dating back to 1850, and what we emit today will similarly have effects that are sometime quite distant. This fact puts the intuition that causal responsibility gives remedial responsibility in some difficulty. It is one thing to say that I, as a well-defined and existing agent, may owe you compensation or repentance if I cause you harm. It is another thing if the harm you suffer is the result of actions that were taken decades or even centuries ago.²⁴ If the harmers are all dead, who should be made to pay?²⁵

We assume that the question of fair adaptation to climate change is largely a question of responsibility: it concerns how to allocate remedial responsibility in a fair way. It is an open question whether an adequate answer to the normative question before us requires that causal responsibility be taken into account. When trying to specify a fair way to distribute burdens associated with remedial responsibility for climate change, it is crucial to see that climate change, and the challenges it poses, is irreducibly an intergenerational question, both in terms of prior causal contribution and future effects. Thus, to answer the question of fair adaptation one must also address the question of intergenerational responsibility.

To summarize: in this paper we intend to address the question of how burdens associated with adaptation to climate change should be distributed, in particular when keeping in mind that climate change is an intergenerational problem. We assume that the basic units of analysis are states. Adaptation is the process, reactive or preventive, that enable us to live with the ill-effects of climate change. We here assume that adaptation is properly seen as a *burden* – in Caney’s words, adaptation measures “require resources that could otherwise be spent on other activities” (2005: 752). We do not

²³ Seminal works in intergenerational justice are (Rawls 2000) and (Parfit 1987). (Dobson 1999) is a useful collection of essays dealing with environmental questions and intergenerational justice. A very strong recent book on climate change, future generations and justice is (Page 2006).

²⁴ Having taken a state-centred approach, we are able to steer clear of the difficult non-identity problem, which has been made (in)famous by Derek Parfit. The basic challenge of the non-identity problem is that what we do at some point in time will have consequences for who mates with whom and at what time. This means that different courses of action will have consequences for what sets of people (or even generations) that will come into existence ((Parfit 1987)). Now, the tricky part is that it is difficult to see in what way one can be said to harm future people once we accept this. Suppose we pollute heavily today, and as a result future people live in a world where the climate is changed for the worse. These future people cannot complain that we in some ways have harmed them, however, since by hypothesis they would not have come into existence *unless* we chose to pollute. As long as the future people agree that they have lives worth living – as long as they do not regret being born – it indeed seems as if they have *benefited* them by polluting. As noted by Page, if one settles for a group-centred view, this problem becomes more manageable. For it is seldom the case that a actions at one point fundamentally affect what kind of groups (such as states) there will be in the future. Thus, even if the set of members in a given group may be different depending on, say, the level of GHG emissions, it still seems to make sense to say that a *group* has been harmed by the emissions – at least as long as we take the view that the group (or state) has an identity that is not strictly reducible to the sum of its particular members ((Page 1999); see also Caney 2005).

²⁵ Others argue that even within a single generation, climate change is too large in scope and too interconnected in terms of causation to make differential causal responsibility a feasible criterion for remedial responsibility. When there are too many hands involved, we need other guiding principles (Young 2006).

consider the possibility that some adaptation might turn out to be all in all beneficial even in strictly economic terms.²⁶ We now proceed to various ways in which remedial responsibility should be allocated with respects to adaptation.

5. Models of Responsibility for Adaptation

The literature on the normative questions of adaptation is fairly recent and small. We here sketch the outlines of various models of responsibility in adaptation. These models are similar to those used to discuss responsibility for mitigation, but as we shall see, some aspects of adaptation present questions that are specific to adaptation, while dropping others.²⁷ In line with our previous discussion about adaptation funds, all models but one (the insurance model, which is based upon contribution), assume that adaptation measures should be distributed according to need among applying states. In light of this relative consensus, we will not discuss further how adaptation resources are to be distributed, though there of course are different ways of distributing according to “need”. The models do differ, however, when it comes to distributing obligations to *contribute* to adaptation funds, i.e. the allocation of remedial responsibility. We begin by considering historical models of responsibility, which state that causal responsibility (and only causal responsibility) translates into remedial responsibility. Next, we consider the idea that all states should assume some equal or equitable level of remedial responsibility. We then treat the model which holds that it is the ability to assume remedial responsibility (the “ability to pay”) that creates obligations, not historical responsibility. We conclude by considering a pure market-based approach: that adaptation should be dealt with just like any insurance-based scheme of risk-management, and that each state must pay premiums in order to be eligible for adaptation funds.

5. 1. Polluter pays

Within the environmental discourse, the polluter pays principle (PPP) is a classic and almost taken for granted guiding-principle for how to share and distribute environmentally related burdens and measures. Environmental taxes are based upon this principle, for example, as are many international environmental regimes such as those for air pollution and chemical pollution. The foundational idea of the PPP is that causal responsibility transforms into remedial responsibility and that one is remedially responsible to the degree one is causally responsible. In other words, those without causal connection to some harm, or some other problem, are not obligated to pay - although they *may do so* anyway, e.g., as a matter of beneficence.

If positioning PPP in our analytical scheme, only positions (a) and (d) are possible. If someone is causing damage, this someone is also obliged to compensate for it. And vice versa.

²⁶ Suppose adaptation requires that drugs for various new diseases are developed. It might be that a state that bears the costs of developing the drugs are able to build an industry around it, with a subsequent gain in economic growth. In such a case it would clearly be wrong to call having to develop a new drug a burden. We assume, not implausibly, that at least some adaptation will be inherently burdensome.

²⁷ In particular, discussion concerning trade with emissions rights, as put front and centre by Peter Singer (2002), are largely inapplicable when it comes to adaptation. It makes little sense to say that a poorly adapted state can buy shares of adaptation resources from an adequately adapted state, for instance.

		REMEDIAL RESPONSIBILITY	
		NO	YES
CAUSAL RESPONSIBILITY	NO	(a)	(b)
	YES	(c)	(d)

Comment. Boxes with dotted lines indicate outcomes that are ruled out by the principle

When applying PPP on the problem of who should pay for adaptation costs (either preventive or reactive), PPP informs us that it is those (and only those) who have caused the temperature increase, and thus also the climate change-related risks and damages, who should bear the adaptation costs. Note also that the principle only works as long as climate change is human induced. If it turns out that climate change is due to natural variation, other principles of other-regarding duties to assist must be sought for, if it is believed that such duties must exist (“nature” cannot be held liable for the damages).

Is this principle reasonable in the case of adaptation? Although issues such as baseline and whether emission cuts should be calculated on total emissions per country or per capita, PPP surely seems appropriate when applied on the issue of reducing the causes to climate change, i.e., mitigation. Morally it seems straightforward that at least those who emit most ought to be among those who should reduce their emissions. A common intuition in everyday life is, as we have already mentioned, that it is those who cause the problem who should clean up their own mess. As Caney has noted about PPP: “This principle has considerable intuitive appeal. In everyday situations we frequently think that if someone has produced a harm [...] then they should rectify that situation. They as causers are responsible for their ill-effects.” (2005: 752).

For all its intuitive appeal, however, PPP encounters some significant problems. Consider first the possibility that polluters are desperately poor. Of course, the present (all too familiar) situation is that it is those who are most causally responsible who are also among the most advantaged (no doubt in part a result of their degree of polluting). But we can imagine a world where the heaviest polluters are also among the worst off. The problem is that the PPP obligates the worst off to pay, regardless of the (one may assume for the sake of argument) extraordinary wealth of the non-polluters.

The most serious problems associated with PPP arise out of its preoccupation with historical responsibility, however. It is unclear whether the principle can handle the fact that climate change is an intergenerational problem. Caney (2005; 2006) has done much to illuminate the problems of applying the PPP in an intergenerational context. The most straightforward problem has to do with the possibility of *holding* those causally responsible to account. It is well-known that there is a significant delay-factor involved in climate change. It takes quite some time for actual emissions to establish itself in the atmosphere and start causing increased temperatures. Furthermore, GHGs have long halving time – for carbon dioxide it is approximately 140 years. This means that present climate change is due to the emissions of prior generations. But they are all dead and gone. So whom do we then hold remedially responsible?

This problem has truly epic ramifications when combined with an individual centred approach, as this opens up for the non-identity problem.²⁸ Since we are testing models against a state-centred approach we can steer clear of some of them. If Sweden, as a collective political entity, has contributed to climate change at an earlier time, it may be reasonable to hold Sweden responsible at a later time. This argument works only as long as it makes sense to treat the collective as something more than the sum of its individual parts. It would then be possible to treat Sweden as an entity that exists over time, independent of its ever-changing citizenry – a useful metaphor is perhaps that of a rope, with no fibre running all the way through it, but all fibres constituting the same compound entity.²⁹ But it is questionable, even if one takes a state-centred view, if it makes sense to hold present generations responsible for the actions of their (dead) forefathers. Later generations might reasonably object to the unfairness of being expected to shoulder burdens associated with actions which they could not control. If their complaint is valid, it is because collectives are *not* independent of their sets of individual members. A future, green U.S. might protest that the pollution of the U.S. in the beginning of the 21st century was not committed *by the same political collective*.³⁰

PPP thus runs into trouble when dealing with the intergenerational aspect of climate change. As Caney has argued it makes little difference to claim that present members of well-off states have *benefited from* pollution in the past (Caney 2006). Present generations could still protest that they had no control over the benefits they were born with and perhaps would have forgone if given the opportunity.

5.2 A Nozickian polluter pays

PPP thus seems ill-equipped to handle the allocation of remedial responsibility across generations. It faces a further problem today since it was not until fairly recently that the ill-effects of GHG emissions became (widely) known. This seems to exonerate historical polluters on grounds of excusable ignorance.³¹ In sum, the PPP seems to fail since it seeks to place blame in places where it cannot be placed. It is not certain that these problems suffice to throw out all historical dimensions of climate change, however. We here want to consider a Nozickian version of the PPP, which is based solely on the notion of causal contribution.

As noted by Perry (1997), a libertarian model of responsibility à la Nozick is committed to strict outcome responsibility, irrespective of whether the outcomes are positive or negative: a self-owning agent is entitled to full ownership of all the good things he/she/it creates, but must also internalize the costs of all the harms he/she/it causes. Since all agents (such as, we assume, states) are self-owning, it would be unfair for one agent to force costs on other agents. Simply put, a Nozickian model of responsibility means that strict liability would reign with respects to all the harm one causes.

²⁸ See (Parfit 1987: ch. 16; Page 1999; Caney 2005: 756-8; Page 2006).

²⁹ The metaphor is Wittgenstein's, used by him to describe the concept of family resemblance, which he employed to criticise conceptual essentialism (Wittgenstein 1999).

³⁰ This U.S._{GREEN} could protest that it is morally different from U.S._{POLLUTING}. Note also that the state-centred view assumes that states are somewhat fixed over time, e.g. inhabit a particular territory. If a region is invaded and occupied by a neighbouring state, for instance, does the acquired region now share in the historical guilt of the invader?

³¹ As a consequence of this ignorance plea, Caney (2005) has suggested that the PPP only be made relevant with respects to post 1990 emissions.

A Nozickian version of the PPP would say that the questions of moral backward-looking responsibility are irrelevant. Nozick's third principle of justice states that justice today may require correction of wrongs being done in the past (Nozick 1974). But to correct these wrongs does *not* have to assume that those who caused the wrongs are or were morally responsible. A good example of this logic is how present Americans have compensated Japanese-Americans for the way they were treated during the 2WW. This correction need not imply that past Americans were blameworthy for what happened (they might have done what they thought was best), nor that present Americans have benefited from what happened at that time or share some collective guilt in virtue of being American. What matters, from a Nozickian point of view, is simply the fact that some illegitimate cost or harm did arise during the war, for which justice requires compensation. If the harm-doers happen to be dead, it is their offspring who have an obligation to do so. Since the costs must fall somewhere, it is (somewhat arbitrarily) those closest to the harm-doers who must internalize the costs, since it would be more unfair to have anyone else taking the costs – offspring can inherit the debts of their ancestors on this account. This way of reasoning probably works best as long as we stick to a group or state-centred view: inhabitants of a state have an obligation to correct wrongs in the past based on pure causal contribution of their ancestors – not *moral* causal contribution.³²

If we apply this principle on our adaptation problem, it seems to hold irrespective of (a) whether the polluters are still alive, (b) whether the ancestors knew that GHG emissions were dangerous and (c) whether the GHG emissions have produced any benefits for subsequent generations. This, we believe, is about as far as one can come by modifying the PPP principle to fit with the adaptation problem. But we do not think it is far enough because one difficulty remain: it is still possible that (some of) the worst off are expected/forced to internalize costs, which is an outcome that most people would claim is unfair. Imagine, for example, a future U.S. which is desperately poor. In this situation, would it be right to say that the Americans must correct for the decisions and actions made by the U.S. during the 20th century? Our intuition is that it would not. There are two beliefs that, in combination or taken apart, serve to explain this intuition. One the one hand, we might be resisting the notion of collective trans-temporal responsibility. One the other hand, we may simply find it unfair that the worst off pick up the tab for a problem, regardless of the way the problem ensued.

5.3. An Equal Shares Approach

A second set of principles to be considered are those that may be called *equal shares* approaches. According to this set of principles, all states should partake in financing adaptation. President George W. Bush seems to have advanced something akin to this in the context of mitigation:

“I’ll tell you one thing I’m not going to do is I’m not going to let the United States carry the burden of cleaning up the world’s air like the Kyoto Treaty would have done. China and India were exempted from that treaty. I think we need to be more evenhanded” (cited in Singer 2002: 30).

What would it mean to be “evenhanded” here? One interpretation suggests itself: *that all states should be obligated to contribute equal amounts of funds to adaptation*. Such a view can be grounded

³² Note that it is likely that Nozick would find such a use of his ideas odious, since he consistently emphasised individualism.

by appeal that the climate is a common good, the management of which is a collective responsibility shared by all. Singer holds the approach in some esteem, if combined with notions of set quotas of emissions and trade of emissions rights (2002).

A first reaction to this principle is that it would be wildly unfair to expect all states to pay set amounts of money to finance adaptation. Such a view disregards completely that some states are vastly more causally responsible than others. Furthermore, on a practical note, if all states, including the very poor, should contribute equal amounts of funds, this would effectively level down the basic contribution made by all to the point that it became insufficient to adequately cover existing needs.

Let us then modify the equal shares approach to mean an *equal proportions* approach. All states should according to this principle be expected to contribute some set percentage of their GNP/per capita to adaptation funds.³³ This would mean that rich states contribute with larger amounts of money whereas poor states contribute with smaller amounts. But all would do their part to finance adaptation to the common problem of climate change. Maybe this could qualify as an “evenhanded” approach?

The problems associated with this view are, however, numerous. Note, first, that some appeals to equal shares/proportions when it comes to cutting emissions are grounded in the claim that a better and cleaner climate is *good* for all states. Therefore, if one is to enjoy the collective good, one also ought to partake in the efforts to maintain that good (although perhaps not to an equal extent). But this argument works only in the context of mitigation. Adaptation concerns coping with the *ill-effects* of climate change. These ill-effects cannot be construed as good, let alone good for all. Climate change will hit different regions in different ways. What befalls low-lying regions need not be what befalls mountainous regions. This means that states that are highly disadvantaged by climate change may complain that they have to pay for outcomes that have to do with the brute fact of where their territories happen to lie (prone to drought, likely to be flooded, etc.). Matters of course become most contestable when those who are in great need to adapt are also only to a small extent causally responsible for climate change to begin with (Bangladesh is a paradigm example).

So an equal shares approach to adaptation cannot be justified by the fact that all have an interest, or at least an equal interest, in correcting or countering the effects of climate change. All may have a common interest in lowering emissions, but not in adapting low-lying states to rising sea levels. What rationale is then left? In our opinion, virtually none at all. Take again our analytical scheme:

		REMEDIAL RESPONSIBILITY	
		NO	YES
CAUSAL RESPONSIBILITY	NO	(a)	(b)
	YES	(c)	(d)

Comment. Boxes with dotted lines indicate outcomes that are ruled out by the principle.

³³ Requiring that all pay equal proportions of their total GNP would, of course, mean that poor states with large populations would suffer a higher per capita cost than rich states with small populations.

The equal shares approach establishes that all states, regardless of their causal responsibility for climate change or their ability to pay, should contribute to adaptation funds. This in effects means that only positions (b) and (d) are possible. But saying that all shares remedial responsibility, although to a different degree, in fact obscures many differences between states that seem morally important, if not decisive. First of all, the equal shares approach obviously disregards historical causal responsibility completely. This certainly seems problematic. A state that has contributed little to the incidence of climate change may perfectly well claim to suffer through no fault of its own. To ask that such a state helps to pay for its own adaptation may seem stark. Moreover, with respects to the ability to pay, the equal shares approach simply does not seem to do justice to the fact that the international system of today is one of very profound inequality. Even when (plausibly) interpreting “evenhanded” remedial responsibility as equal proportions rather than equal amounts, it still seems unfair to expect the worst off to share the same responsibility to adapt as the most advantaged. It may plausibly be suggested that the worst off should use any surplus resources to address other problems, such as poverty or famine.

5.4 Ability to pay

Now, if historical action and equal shares are not legitimate or at least a good-enough bases for claiming burden-taking, then what is? One answer might be found by glancing at how burdens and costs are distributed in traditional welfare states, where *ability* is an important guiding principle.³⁴ On a pure ability to pay approach, the ties between causal and remedial responsibility are severed completely (which is a good start for us). Those who are able to pay have an obligation to pay.

When addressing the *ability to pay* approach to our analytical scheme it appears that all four outcomes are possible, and some of the moral objections it encounters have to do with the possibility of (b) and (c). Inhabitants of box (b) may complain that they are expected to correct problems that are not of their making, and inhabitants of box (c) appear to be able to free ride on others’ contributions.

		REMEDIAL RESPONSIBILITY	
		NO	YES
CAUSAL RESPONSIBILITY	NO	(a)	(b)
	YES	(c)	(d)

How would adaptation costs be distributed if being done in line with the ability to pay principle? The more advantaged in terms of paying ability, the larger the share of the burden-taking, would seem to be the straightforward interpretation. In the case of climate change, today’s most advantaged are more or less also those who are most causally responsible for the incidence of climate change, since access

³⁴ The most straightforward expression is perhaps Marx’s slogan: “from each according to ability, to each according to need”.

to cheap energy has been the *primus motor* behind most of hitherto wealth increase. We may, however, envision a *future* situation where the worst off are also those most causally responsible for climate change. In this situation and sticking to the ability principle, the most advantaged are still required to pay most in virtue of their ability to do so.

It seems evident that although ability is a common distribution principle in welfare states, it is problematic to apply to the adaptation case. Apart from a number of institutional objections, the principle can certainly also be questioned from a fairness point of view. First we have the problem of *double penalizing*, where the following example is a good illustration. Assume, in an initial position, that we have a heavily polluting country *X*. Because of a general will to comply with ever stronger climate change regimes, *X* voluntarily takes the costs inherent in transforming its economy to a GHG-neutral one, and does this successfully. Because of the ability to pay criteria, *X* will have to pay comparatively more than other countries – who are poorer but perhaps emit much more GHG than *X*. This means that *X* takes the cost of both (a) its own transformation and (b) others' non-transformation. Second, there is the related problem of *constant excuse*, which refers to the heavy - but poor - polluter who, if the ability to pay criteria is adopted, may continue its polluting since its poverty means that it will not be expected to pay anyway. Third, there is the problem with *the new polluter*, which can be captured with the following example. Assume that many states have polluted heavily in the past, and that one state *S* recently has experienced a boom in economic growth and starts polluting severely. If *S* is able to pay, it is obligated to do so. But this was not expected of the polluting states in the past. So *S* has to pick up costs which other states did not, and it may seem as if *S* is not equitably treated.³⁵

Many of the problems that a pure ability to pay approach encounters have to do with its complete disregard for historical emissions, i.e. causal responsibility over time. It is not difficult to construct theoretical examples, nor to conceive real ones, that lead the principle into recommending seemingly unfair outcomes. We now turn to a recent attempt to combine an ability to pay approach with some historical elements of responsibility: Caney's hybrid model.

5.5 A modified ability to pay approach: Caney's hybrid account

Simon Caney (2005) has recently advanced a "hybrid" model of justice in climate change, which attempts to combine the ability to pay approach with some aspects of the PPP.³⁶ Caney, as we have seen, has incisively criticised the PPP, particularly since it does not work as an intergenerational principle, but also since knowledge that GHG emissions cause climate change is fairly new. He advocates a system where all agents are entitled to emit GHGs up to some level, and are (as of 1990, when the ill-effects of emissions could reasonably be expected to be known, and onwards) under an obligation to compensate for exceeding their share.³⁷ But since much emission is caused by polluters that are dead, unable/ unwilling to pay, or who were ignorant of the effects of their actions, Caney

³⁵ This line of reasoning underscores intuitions that developing states should enjoy a right to pollute (heavily) over a transition phase. They should enjoy that right precisely since developed have taken that right in the past.

³⁶ Caney himself prefers to see his hybrid model as complementing the PPP with some element of the ability to pay approach, but we believe that ability to pay is given a more fundamental standing in his model.

³⁷ Caney advocates an individualist-centred approach to climate change. Thus, the quotas are, presumably, individual quotas, and those able to pay are explicitly rich persons, not rich states. Therefore, a wealthy Indian will be under a weightier obligation to compensate than a poor American on Caney's account.

proposes that it is the *most advantaged* who have an obligation to adapt/mitigate to the extent that suffices to cover the emissions by polluters who are not able or willing to pay.³⁸ They have this obligation based on precisely their ability to pay:

“The most advantaged can perform the roles attributed to them more easily, and, moreover, it is reasonable to ask them given (rather than the needy) to bear this burden since they can bear such burdens more easily. It is true that they may not have caused the problem but that does not mean that they have no duty to help solve this problem.” (Caney 2005: 769)

As in the case of the pure ability to pay approach, all four combinations of causal and remedial responsibility are possible. The starting point is that all agents are to be held remedially responsible to the extent that they exceed their quota. But in order to correct or counter effects of polluters unfit to be held responsible, the most advantaged have a remedial responsibility that does not befall the worst off – regardless of the degree of causal contribution of the former.

Caney’s hybrid model is promising, but some problems are not properly worked out. First of all, it is (as Caney knows) arbitrary to draw the line for excusable ignorance at 1990. Some agents are still today ignorant of climate change, and cannot reasonably be expected to know, at least if one (like Caney) pursues an individualist path. Secondly, defining the most advantaged is never going to be easy. How advantaged is advantaged enough? At what point does a poor but developing emitter become well-off enough to shoulder the burdens of its own emissions? Furthermore, it is somewhat unclear to what extent the hybrid model is feasible on a thoroughgoing individualist account. It seems likely that emission quotas and obligation to mitigate/adapt will in practice befall states. Moreover, to assess the extent to which *individuals* post-1990 have exceeded their quotas seems all but easy.

For our purposes, however, Caney’s hybrid account should be reframed so as to (a) treat states as the basic carrier of responsibility and (b) exclusively concern adaptation. To treat states as the main responsibility carriers simplifies the model significantly – what we are now considering is whether states have exceeded their 1990 quota and the relative (per capita) wealth of the states. Furthermore, the excusable ignorance objection loses strength.³⁹ However, some of the problems associated with the pure ability to pay approach plague Caney’s hybrid model too. First of all, well-off states without causal responsibility may complain that it is unfair to make them take remedial responsibility for the shortcomings of others.⁴⁰ This becomes particularly relevant in the case of adaptation, which, unlike mitigation, cannot be seen as something which is good for all. Caney agrees that the most advantaged *are* unfairly treated if they are cleaning up others’ mess, but thinks that this outcome is less problematic than the alternatives.⁴¹ We further risk creating constant polluting states that, because of

³⁸ Caney also holds that it is the most advantaged who have an obligation to create and uphold a climate change regime that discourages non-compliance with the quotas.

³⁹ While some individuals remain non-culpably ignorant today, it is less likely that states as such can claim to be ignorant of climate change.

⁴⁰ Particularly problematic is the possibility that the most advantaged state of all may simply refuse to pay, which would create obligations among less advantaged states.

⁴¹ *Inaction*, first of all, seems reckless. To hold none remedially responsible just because the de facto causally responsible cannot pay is not viable. Thus, someone must shoulder the burden. But the polluters sometimes cannot afford to pay – they may be amongst the worst off. To expect the most advantaged to pay is unfair, but decidedly less unfair than to make the poorest states shoulder the burden of climate change adaptation, Caney argues (Caney 2005).

their poverty, have no incentives to cut their emissions. They can get their adaptation needs funded by others, and share no obligation to help others adapt.

Note also that Caney's model seems somewhat blind to the objections that can be levelled against the PPP from an intergenerational point of view. Caney argues that all should accept remedial responsibility for mitigation/adaptation caused by their own excess emissions. If one cannot shoulder this responsibility, however (e.g. because one is dead or too poor), the richest states have to step in and take the burden. But again, since later generations (who happen to be among the most advantaged) are held remedially responsible for the action of prior generations on this account, the latter may complain that they are being held liable for things they in no way could control. Some problems thus still remain for the hybrid model, but we would say they are of less significance and the notion of combining aspects of the PPP with an ability to pay approach – together with a state-centred point of departure - is promising and appear to be the model that comes out best so far.

5.6 An insurance based approach

The international negotiations on climate change mitigation have largely been facilitated by market-based solutions that have developed over time. The most obvious example is the emerging market for tradable emission permits. This system speaks a language that both the market itself and the market-based - heavy polluting - countries understand, can relate to and even sympathizes with. Political theorists and ethicists have defended a market-based solution to cutting GHG emissions as well. Peter Singer, for instance, in his *One World* (2002) argues that a good way to mitigate would be to assign equal per capita emission rights to each state, provided that the quotas are set in such a way that total emissions are at a safety level. This would mean that present heavy per capita polluters (such as the U.S.) would have to make significant cuts in emissions, whereas low per capita polluters (such as India) could increase their emissions somewhat. The key ingredient in this scheme, Singer states, is that it facilitates a market based logic that has beneficial consequences. Heavy per capita polluters will buy emission rights from states that are below their quota. This enables that the former can transform their economy over time without making dramatic changes, while the latter have a product in demand that can be sold at a handsome price. As long as the per capita quota is set at the right level, Singer makes a strong case for that a market solution could lead to effective (and perhaps also fair) mitigation.

What (if anything) would be an equivalent market solution for climate change adaptation? Well, certainly not any adaptation funds. Adaptation permits or rights seem distant too. There is a more obvious candidate. In our introduction we may give the impression that adaptation is a rather new way of approaching societal risks. This is not the case. On the contrary, among institutions dealing with risks (of any kind), adaptation is a self-evident approach, which has been developed almost to perfection by the insurance industry. Adapting society to better cope with whatever external and internal change is a prerequisite for the insurance industry to keep down both their remunerations and premiums. By taking inspiration from, e.g., Stripple (1998), Burton *et al.* (2006) and Linnerooth-Bayer & Vári (2006) it is thus not too far-fetched to anticipate that a system develops, in which *states* will have access to insurances guaranteeing them some form of adaptation measures - either in the form of physical protection, if the climate change effects can be determined *ex ante*, or else in the

form of *ex poste* economic compensation - provided that they pay the premiums for the protection product.

There are however major problems with this model too. One is of a pure insurance-philosophy nature: If I have causal responsibility for the damage I claim (e.g., I have smashed my own window), I am not entitled to enjoy my insurance (unless I have some kind of third party liability insurance). If the same logic is scaled up to state-level, it means that if climate change is human induced, then, reasonably, it is significantly more difficult to claim anything from the insurer since the country may be causally responsible for the problem it claims compensation for. On the other hand, however, if the problem the country is experiencing is caused by natural forces (e.g., weather variability), then the insurer can usually make use of the *force majeure* criterion (Carlsson & Stripple 1998), which, in the case of climate change, would again leave the country without compensation.⁴² These issues may be possible to straighten out, but they certainly complicates matters.

Furthermore, if we try to position an insurance based approach in our analytical scheme, we find that it appear to completely eschew any questions of responsibility. It is only those (states) who *de facto* have paid their premiums who are entitled to the adaptation resources. Perhaps then the insurance model is completely out of place in a discussion about climate change adaptation and justice to future generations, since it does not seem to adequately point out anyone responsible for such measures? This would indicate that the insurance model ought to be excluded from any discussions about adaptation. But that seems absurd. The way we understand it, to say that the insurance model has nothing to do with responsibility is only valid as long as we assume that “responsibility” implies “responsibility for others”; a criterion we have perhaps more or less taken for granted here. But we need not assume this. What an insurance model in fact establishes is that each and everyone should take responsibility *for their own interests*. Thus, the principle *does* correspond with remedial responsibility (i.e., (b) and (d) in the analytical scheme) but represents a kind of strict self-regarding remedial responsibility: those who contribute to their safety also have the right to claim security.⁴³

However, since the insurance model completely disregard historical responsibility as well as remedial responsibility (for others), it can (and perhaps also ought to) be considered extraordinarily unfair. Not least if recalling the mantra: “those who are assumed to suffer most from climate change are mainly the ones who have contributed least to its origin”. However, the model is no less unfair than most other procedural models, which all have in common that they largely disregard the status of the actors involved in the game. Because, to e.g. consider the degree to which the actors are equal - in this case equal in terms of vulnerability and economic capacity to protect themselves – is simply not part of that game. What matters is instead whether the procedures are fair and complied with – something the contribution criteria (i.e., paid insurance premium) is a guarantee for. Thus, to claim that the insurance model is unfair *per se* would require a much more thorough analysis than is allowed for in this paper.

⁴² Supposedly, in the case of global climate change and especially the collective causal responsibility that at least a large part of humanity has, the problem of “personal responsibility” must not be such a big problem.

⁴³ While we here only pay attention to pure market-based insurance constructions, both Stripple (1998), Burton *et al.* (2006) and Linnerooth-Bayer & Vári (2006), discuss complementary “products” where criteria such as social justice *could* be built in, they argue. Such approaches, however, easily navigates us towards traditional welfare-state programmes (and they rather tuff objections that have been raised against such ideas), where (social)insurance constructions are popular – only that now these constructions are supposed to be implemented and managed internationally and intergenerationally and this in an anarchical international political system.

6. Concluding Discussion: fairness and feasibility in climate change adaptation

What are the conclusions to be drawn from this paper? As the reader may have noted, we believe that a fair way of distributing remedial responsibility would involve both considerations of historical responsibility and the ability to shoulder burdens. The equal shares approach disregards both, and so would seem to be most decisively rejected. Various versions of the PPP are weak since they seem ill-equipped to handle some intergenerational problems, in particular the quite obvious point that yesterday's polluters are dead by now, and that it seems unfair, even if one takes a state-centred approach, to burden existing generations for what prior generations did. Furthermore, the PPP is inattentive to the ability to pay. We can see the problematic nature of the PPP as a general principle by imagining a world in which the poorest states are also the ones who pollute the most – surely it seems unfair to let the poor shoulder the burdens of adaptation if there are others who can do it much more easily.

Conversely, however, the ability to pay approach suffers from its disregard for historical considerations. There are valid moral claims, we believe, in saying that those with causal responsibility should also be the ones who accept remedial responsibility, or at least more of it. Imagine it this way: two states are equally well-off and equally able to contribute to climate change adaptation. State *A* have a history of heavy pollution, however, whereas state *B* has not. Other things equal, we propose, it seems obvious that *A* should take a greater remedial responsibility than *B*. Examples such as these suggest that recent rejections of historical principles of responsibility may be too hasty (see also Gardiner 2004).

Logically, then, we seem propelled towards some hybrid account, which incorporates considerations of both ability to pay and causal responsibility. Caney's recent hybrid model, the outlines of which we have sketched above, seems like a good place to start. In our opinion, Caney's model is clearly the one which best withstands critical scrutiny in this paper. There are no reasons why it could not work as a guide for fair adaptation, though work remains to be done on the notion of hybridisation (not least, as in all pluralist theories, on compatibility).

To say that something akin to Caney's hybrid model would be the most fair way to distribute burdens associated with global adaptation is not to say that it is the most feasible, however. We have earlier pressed on the fact that whereas mitigation produces a good virtually all states desire, adaptation is to be seen as something which is good for particular actors. This in all likelihood means that an international adaptation regime will be harder to set up and enforce than a mitigation regime – in particular since the international system is still without a common power.⁴⁴ Individual states will be more likely to shirk their responsibilities if they perceive that they get little back from their contributions in terms of pure self-interest. Based on these considerations, the most feasible future adaptation regime is one along the lines of the insurance model.

⁴⁴ Traxler has thus noted: "Each nation is (let us hope) genuinely concerned with this problem [climate change], but each nation is also aware that it is in its interest not to contribute or do its share, regardless of what other countries do (...) In short, in the absence of the appropriate international coercive muscle, defection, however unjust it may be, is just too tempting" (Traxler 2002: 122).

While the insurance model seems like a normatively resigned way to adapt, more focused on self-regarding than other-regarding duties, a pragmatic political interpretation is that this may in fact be rather good - for feasibility reasons. If we are correct in assuming that the negotiating parties (at least the more powerful ones) tend to search for market solutions to the problems discussed under the Kyoto regime, then a climate change insurance with a premium set according to, e.g., (1) degree of vulnerability and (2) estimated probability of harm, may be what they are all after.

While this might appear relieving for those parties who think they can afford such insurance premiums (either because they are very rich or because they live in less vulnerable areas), the criteria for setting the premium imply a most uncertain future for those poor countries who are assumed to be most vulnerable (Jagers, Paterson & Stripple 2003). An important question here is of course if the insurance and reinsurance industry would manage to take the costs for a frequent or at least repeated number of hurricane Andrews or Danube floodings? Probably not. However, the industry has already developed a “prototype” that would: *catastrophic bonds*, which mean that the insurers convert the climate change risk into a more neutral risk that can be sold on the international capital market (Stripple 1998). Hitherto experiences suggest that such risks are attractive for capitalists since they hardly correlate with any of the traditional market risks (Stripple 2002). Thus, a not too far-fetched guess is that concurrently with increasing climate change effects, the rich world will have the capacity to compensate their damaged properties while the rest of the world is forced to reconstruct on its own steam every time the weather gods are against them. It is true that this way of reasoning has little to do with justice and responsibility, i.e., the analysis performed in this paper but it may be perceived as feasible and thus a near at hand “solution” for the least vulnerable.

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