



Analysis

Perceptions on equity and responsibility in coastal zone policies

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ABSTRACT

This paper studies public perceptions of fairness in managed retreat policies. We try to empirically test the acceptance of the following four principles of fairness: efficiency, need, responsibility and priority to property rights. Using responses from a questionnaire, the objective of the paper is to generate information on the issue of solidarity between people exposed to the risk of climate-change-induced flooding and those who are not, as regards to funding managed retreat policies and damage compensation. To that end two population zones (Coastal and Hinterland) were surveyed in order to characterise personal preferences of stakeholders and distributive preferences of third parties. Results show (i) a support for national solidarity in the funding of managed retreat policies, (ii) a difference in people's support for the responsibility principle depending on whether it is embedded in a general principle of justice or in a particular compensation scheme and (iii) a difference between distributional judgments of the coastal inhabitants (stakeholders) and those of the Hinterland (third parties) according to the choices of the funding principles of damages on private assets and the choices of the general principles of fairness in managed retreat policies.

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1. Introduction

The sea-level rise expected to occur due to climate change will accentuate the beach erosion process and increase the risk of flooding for sea-front constructions. Coastal vulnerability is a matter of concern as the areas potentially affected are densely populated. In Languedoc-Roussillon (South of France) studies suggest that climate change will not affect the frequency of storms but will greatly magnify their impacts due to the additional water height (40 cm by 2060 (Lecacheux et al., 2011; Magnier, 2013)). Such impacts may be similar to those of 50-year storms, which, by 2060, may have become decennial. The prospect of sea-level rise calls for adaptation policies at national and local levels. Such policies are faced with major redistribution challenges concerning both sharing the financial burden of adaptation between exposed and non-exposed populations and the damage compensation process.

To begin with, current adaptation funding systems may become unsustainable in the face of increasing demands for compensation. This applies in particular to countries where flood insurance systems are based

on the solidarity principle through which everybody, regardless of their risk exposure level, contributes to the reimbursement of damages. In France, since 1982, natural disaster risks are covered by an insurance system in which compensation payments come from a national fund financed by a compulsory contribution paid by all households (home and car insurance premiums are increased by 12% and 6% respectively). This principle of solidarity may be called into question given the expected rise in the cost of damages and the strong concentration of risks in a few geographical areas. For instance, between 1982 and 2009, 6.9 natural disasters occurred in French Mediterranean coastal communities, compared with 2.5 in the country as a whole (CGDD, 2011). Moreover, currently-recommended adaptation policies (Abel et al., 2011; Boateng et al., 2007; Cooper and Lemckert, 2012; Cooper and Pile, 2014; Gibbs et al., 2013; Kelly and Adger, 2000;) seek to reduce asset vulnerability through the managed retreat of coastal constructions and developments; the reconstruction of beaches and dune systems providing a natural protection system which is more resilient in the long term. Nevertheless, despite financial compensation, such managed retreat policies face important problems of acceptability. The constraints linked to the acceptability of these policies have been examined through perception surveys of local residents. These surveys show the importance of socio-demographic criteria, such as age, income level and education (Myatt et al., 2003; Rey-Valette et al., 2012) and of various factors

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such as the tenure status (tenant or homeowner), the length of residence, the relocation area and job opportunities in the relocation zone, the recollection of earlier storms, the sensitivity to climate change and the proximity of the family (King et al., 2014). Glenk and Fisher (2010) also show the significance of efficiency, solidarity and sustainability in the implementation of these policies. Finally, acceptability also depends on institutional factors related to the magnitude of restructured area and the budget required to compensate the displaced persons and the procedures and conditions relating to expropriation.

According to Turner (2007), these issues are reflected in significant redistributive conflicts which, if ignored when evaluating coastal zone policies, may undermine the relevance and position of cost–benefit analysis in public decision-making. Numerous studies agree that equity, i.e. the way the costs and benefits are distributed, plays a decisive role in both the implementation and the evaluation of environmental policies. In international negotiations on climate change in particular, the fairness principle may facilitate collective action and help achieve objectives shared by different countries (Lange and Vogt, 2003; Miller, 2008; Ringius et al., 2002). Beyond this instrumental role, equity also counts in a more substantive way in that people have distributive preferences which influence their willingness-to-pay for climate change adaptation policies (Atkinson et al., 2000; Cai et al., 2010). Studying individual distributional judgments is thus an important step in evaluating the social welfare generated by environmental policies (Johansson-Stenman and Konow, 2010). In this perspective, social justice theories provide the general justice principles on which individual distributional judgments can be built (Konow, 2003; Schokkaert and Gaertner, 2011).

This paper studies public perceptions of fairness in managed retreat policies. Using responses from a questionnaire, the study sought to investigate the issue of solidarity between people exposed to the risk of climate change-induced flooding and those who are not, as regards funding managed retreat policies and damage compensation. In addition to the issue of perceived fairness, the paper raises the question of whether people's elicited distributional judgments are independent of how they are affected by the chosen principle.

The article continues as follows: section 2 identifies the dimensions of equity from the main justice theories then examines how the principles apply in the context of adaptation policies defined at local and national levels. Four principles are examined: efficiency, need, responsibility and priority to property rights. Section 3 presents our survey protocol. The results are presented and discussed in the fourth and fifth sections, focusing on funding and compensation issues. Section 6 concludes the paper.

2. Social Justice Principles and Fairness Criteria in Managed Retreat Policies

The particular characteristics of climate change related risks (e.g. myopia, the lack of recollection, the progressive nature of the risk, the scientific controversies) reinforce optimism and status quo biases (Pfister and Böhm, 2001). In addition to the question of “how to adapt?” the question of “when to intervene?” is crucial as there is a strong postponement propensity given the problems of acceptability and the expected improvement in technology and in risk assessment in the future (Dutt and Gonzales, 2012). This issue of timing raises the issue of intergenerational solidarity and fairness which is not addressed here. We focus instead on territorial solidarity which is less frequently discussed but is nonetheless a key-feature in the implementation of managed retreat policies: given the funding requirements, these policies involve a redistribution of tax receipts well beyond those who are directly affected. An important question then concerns the geographical scale at which such taxes are acceptable. Moreover, planning managed retreat policies requires inter-communal solidarity in order to define threatened areas and manage expected migration patterns and fiscal and activity transfers.

These issues led us to focus on the fairness principles to which individuals refer in the distributive context of national and local adaptation policies so that they may be taken into account in the practical implementation of such policies. It is clearly established in the literature that preferences for equity depend on the distributive context, including the set of individuals being compared, the variables being used to define and interpret the principles, and the type of asset being distributed (Favarelli, 2007). In other words, depending on the domain considered, the relative significance of each justice principle, its implementation and the trade-offs between individuals will not be the same. The main theories of justice can then be used as a guide to define the general ethical principles that will be valid in different contexts. Within a specified distributive context, the general justice principles will translate into precise rules to define the sharing of costs and compensation.

Most of the work concerning equity in climate change adaptation takes an international perspective focussing on the countries themselves. In this case, the issue is to determine how and in how far the responsibility for emissions from developed countries legitimises compensation for Southern countries and on which criteria such compensation should be based. These studies draw on the principles of justice to justify (i) taking into account the countries' responsibility in climate change impacts when establishing the level of contribution to an international adaptation fund and (ii) the vulnerability criterion for the allocation of these funds (Grasso, 2010b). Moreover, as there are no supranational institutions to implement the principles, each country will only participate in the agreement if the latter is seen as fair and procedural justice principles then have a key role to play (Grasso, 2010a; Paavola and Adger, 2006).

In the case of national adaptation policies, the subjects of the justice system are the individuals and three contextual elements appear to be crucial for the issue of equity in coastal management policy. First, the issue of asset and activity relocation in the coastal zone calls for a compromise between the maintenance of recreational services offered by beaches to both local residents and tourists and the respect of property rights. This becomes a central argument when positions are taken on compensation (Cooper and McKenna, 2008). Moreover, the literature on strategic retreat policy acceptability has highlighted the anti-redistributive effect of compensation as one reason for the rejection of these policies (Pilkey, 1990). In fact, front-line residents who suffer the most significant damages and are likely to benefit from compensation through the solidarity principle are also, in many cases, the wealthiest. Therefore, it may be appropriate for compensation criteria to allow for a preferential treatment based on criteria other than individual property rights, such as income or information about the risk incurred.

Four general principles of social justice¹ can be considered in order to resolve distribution dilemmas: efficiency, need, responsibility and priority assigned to property rights. Table 1 relates these principles to broad approaches in social justice and transposes them into the context of coastal defence management policies. Each general principle is embodied in different equity criteria which serve as a reference in the funding of retreat policies and damage compensation.

The efficiency principle calls for maximising social welfare in the Utilitarian tradition which is dominant in welfare economics (Harsanyi, 1955). This principle is implemented through standard cost-benefit analysis that seeks the greatest return in terms of overall social net benefits from public investments or expenditure. This principle can be found in studies on burden-sharing rules of mitigation in international climate policy in the form of a vertical equity criterion based on the ability to pay (Klinsky and Dowlatabadi, 2009). The aim is to integrate the differing capacities of countries to reduce their emissions or to adapt at lower cost. In this context, the efficiency principle is reflected in an equality criterion in the effort to reduce emissions where effort is measured in terms of financial or opportunity cost. The efficiency

¹ The paper focuses on universalist, individualistic and liberal (plurality of conceptions of the good life) theories of social justice.

Table 1
Transposing principles of justice to coastal defence management policies.

<i>Theories of social justice</i>			
Utilitarianism (Harsanyi)	Libertarianism (Nozick)	Liberal egalitarianism (Rawls)	Luck egalitarianism (Dworkin)
<i>General principles of justice</i>			
Efficiency principle, Maximising total surplus	Priority to individual property rights	Need principle, priority to the worst-off	Responsibility principle
<i>Equity criteria in coastal erosion management policies</i>			
Policy options are chosen according to the value for money expected from coastal defence expenditure, market-based approach for flood insurance, willingness-to-pay gradient, and compensation criteria based on market values of assets.	Compensation criteria based on market values of assets.	Compensation criteria target the worst-off defined according to (i) the level of income or (ii) whether they are primary- or secondary-home owners. Insurance regime based on the principle of solidarity that disconnects insurance cost and individual risk level	Choice-sensitive compensation criteria: differentiated compensation for inhabitants depending on awareness or not of inundation risk when they took the decision to locate to the area.

principle is consistent with a willingness-to-pay gradient in the allocation of resources and supports the determination of flood insurance and compensation criteria based on the market value of assets in the context of coastal defence management policies.

The issue of justice is traditionally presented as a trade-off between efficiency and equity. The equity principle provides arguments which can be used to give priority to reducing inequality when allocating resources rather than maximising total surplus (Tungodden, 2003). The principle of preferential treatment based on need is one of the central arguments developed by the liberal egalitarian approach which is critical of Utilitarianism, in particular Rawls' theory of justice (1971). According to the latter, social policy evaluation must be based on the situation of the worst-off and public policies should seek to improve the position of the least-advantaged. In the context of coastal erosion management policies, this principle takes at least two forms in policy proposals depending on how "worst-off" is defined. The definition may focus either on income and wealth or on the status of private property ownership entitled to compensation. It might be argued that the least advantaged are those whose main home (asset) is threatened by coastal risks rather than those owning holiday homes. Such a definition targets the most vulnerable households and distinguishes between 'subsistence' and 'luxury' activities and assets, reflecting the terminology used by Shue (1993) concerning greenhouse gas emission in order to introduce a preferential treatment for countries, based on need, in the issue of justice in international agreements on climate. As far as flood insurance is concerned, the liberal egalitarian approaches of social justice entail an insurance regime based on a solidarity principle that disconnects insurance cost from individual risk.

One of the most recent contributions of the justice theories has been to introduce the notion of responsibility as an additional factor in the efficiency-equity trade-off. The broad idea behind this notion, called luck egalitarianism (Anderson, 1999) is that redistribution must only target inequalities caused by factors which are beyond the responsibility of the individual (Arneson, 1989; Cohen, 1989; Roemer, 1993). Equity requires compensation for outcomes or risks that are beyond individual choice and control but not for outcomes for which they can be held responsible. This distinction comes from the difference made by Dworkin (1981) between "brute luck" and "option luck". The former characterises an outcome where the individual made no explicit choice and is therefore arbitrary as regards distributive implications whereas the latter concerns an outcome which is the result of a gamble or a voluntary choice on the part of the individual and, for that reason, cannot qualify for compensation. The responsibility principle plays an important role in normative economics through the theory of fair compensation (Fleurbaey, 2008). According to Konow (2001), this principle, together with the efficiency and need principles, is one of the three general distributive principles around which the distributive preferences of individuals revolve. In the context of international climate justice, the idea of differentiating countries' duties on the basis of their responsibility for climate impacts is very much at the heart of the debate and of

proposals concerning the fair sharing of adjustment costs. The "polluter pays" principle, which highlights the historic causal responsibility of industrialised countries, is the most emblematic example of the responsibility concept and of its challenges. Applying the principle is tricky because of the great complexity of the relationship between emission and impacts (distinction between the anthropogenic and non-anthropogenic nature of emissions; non-linear relationship through time). Moreover, the application of the notion of responsibility to collectives, States and generations raises important ethical issues (Caney, 2005). Several authors stress that the responsibility principle must be complemented by a kind of prospective responsibility based on the ability to pay and that it cannot be limited solely to historical responsibility (Grasso, 2010a; Miller, 2008; Paavola and Adger, 2006). Regarding coastal management policies, Cooper and McKenna (2008) emphasise that owners are necessarily aware of the fact that public protection investment will not continue in the future. Several authors (Pye and Blott, 2006) conclude that individuals are personally responsible for their choice to make risky investments on the coast, given the information available on sea-level rise. In France, people buying properties have been informed of the potential risk since 2007. It can therefore be assumed that they make an informed decision and that they are prepared to encounter the financial risk through, for instance, higher insurance premiums or lower compensation payments. As a result, the date of purchase of properties at-risk may be a relevant criterion to differentiate the level of compensation by linking hazardous location and informed choice.

In the context of managed retreat policies, the issue of the relevant basis for the monetary compensation of private assets draws on a principle of procedural justice. Two compensation schemes have been used in compensation policies: market-value-based compensation and carrying-value-based compensation. The latter integrates asset depreciation and puts long-term owners at a disadvantage compared to newer ones. This differential treatment appears to be unfair according to Nozick's (1974) which argues for voluntary market-based transactions to define entitlements.

Based on the justice principles presented above, our work tested the significance for managed retreat policy acceptability of several equity criteria based on: the purchase date of the assets, the level of income, the nature of the exposed assets (main or second homes), and the information level about risk in the decision to purchase a property.

3. Presentation of the Study Zone and the Survey Protocol

3.1. Description of the Study Zone

Introducing individuals' preferences for equity into the evaluation of environmental policies implies that such preferences can be studied and known empirically.

The study sought to empirically test the acceptance of different justice principles using a questionnaire completed by coastal and hinterland inhabitants. The sample was defined so as to vary the level of

concern of the respondents. It comprised both coastal inhabitants directly affected by retreat policies and likely to qualify for compensation under selected criteria and people who were not directly affected as they live in the hinterland. The survey was geographically structured in this way in order to test respondents' impartiality and to investigate whether elicited fairness judgments are independent of the distributional situation of the individuals as their support for fairness principles may be another way to pursue their self-interest. The so called self-serving bias refers to the possibility that people adhere to the distributive principle that benefits them most and not to the one they genuinely consider to be the fairest. In which case, preferences would no longer be distributive but personal. Babcock and Loewenstein (1997) offer a survey of the empirical evidence suggesting that self-serving assessments of fairness are likely to occur when competing outcomes could plausibly be viewed as fair. Dana et al. (2007) show that giving individuals the moral 'wobble room' to act in their self-interest, while maintaining the illusion of fairness, significantly decreases fair behaviour. Lange et al. (2010) test the assumption of a self-serving use of equity criteria in international climate policy. Their empirical analysis is based on a questionnaire study of individuals actually involved in the negotiations. The findings indicate that equity notions in international climate negotiations are mostly correlated with the self-interest of the negotiating parties. Nevertheless, philosophers and social scientists have long argued that there is a close connection between justice and impartiality (Harsanyi, 1955; Rawls, 1971). Hence, empirical research on distributive justice has focused on the views of impartial spectator or third party in contrast to that of implicated parties or stakeholder. Questionnaire surveys involve asking respondents for their judgments as to the fairest outcome in a distributive problem in which they are not stakeholders, whether they are third parties or social decision-makers. (Konow, 2009; Cappelen et al., 2013).

3.2. Sampling Protocol

The surveys were carried out on the SCOT² territory focussing on two coastal towns and three towns in the hinterland (a map is available in the supplementary material). A stratified sampling design was adopted. Level 1 consisted of towns and villages which were selected to cover the diversity of the situations on the coast and in the hinterland. On the coast, Vendres depends both on tourism and wine production whereas Valras-Plage is the archetype coastal resort with a very large number of second-homes. In the Hinterland, Béziers is the largest town in the area. Further inland, Murviel les Béziers is a typical suburban wine-producing town whilst Saint Chinian is a typical wine-producing village with rural tourism appeal (cf. map). In level 2, the survey population consisted of residents who had their main home in the selected towns and villages. We ensured that a similar number of people were surveyed on the coast and in the hinterland: 122 along the coast and 136 in the hinterland i.e. a total number of 258 respondents.

3.3. Questionnaire Design and Sample Characteristics

The questionnaire comprises four parts with some questions relating specifically to coastal or hinterland inhabitants (Table 2). It is available in the supplementary material. Participants were invited by phone. The questionnaire took around one hour to complete. The survey was conducted in rooms made available by the town councils. Thirteen sessions were organised with an average of twenty participants for each. The questionnaires were self-administered in the presence of 7 researchers. The questions related to fairness principles were ranking questions asking respondents to select from a list the two principles

² Territorial Coherence Schemes (SCOT) are a territorial planning tool that enable local authorities to coordinate their choices in urban planning, housing, transport, environment and economic development. The SCOT around Béziers, which is the pilot site for the study, comprises 270,000 inhabitants in 87 cities, towns and villages.

Table 2
Questionnaire design.

Part 1. Place of residence: information about the property, beaches' uses and interests and knowledge of the coastline
Part 2. Perception of inundation and risks: general perception of risks, risk of sea-level rise in Languedoc-Roussillon and probability of future storms
Part 3. Perceptions of fairness in managed retreat policies: perceptions of fairness concerning funding and compensation
Part 4. Personal characteristics: gender, age, marital status, education, income...

that they considered to be the fairest. The main characteristics of the sample are shown in Table 3.

The respondents were generally better educated than the regional average (46% had a higher degree versus 26.5% on average in Hérault (Insee, 2012), with a higher proportion of skilled workers and company managers (6% vs. 4%), of senior managers (9% vs. 6.5%) and especially of retirees (43% vs. 23%). These differences may be explained by the fact that we over-represented home owners (73% compared with an average of 55% in the department) because they are more concerned by the issue at hand. Regarding solidarity practises, almost half of respondents belonged to one or more associations, but only 19% were regularly involved on a voluntary basis and nearly two thirds of them had made donations to charities in the previous year but generally (80%) as a one-off.

4. Results

4.1. Support for National Solidarity in the Funding of Managed Retreat Policies

The analysis of the funding choices for managed retreat policies (Table 4) shows a strong bias towards involving the community as a whole, mainly through fiscal measures at the national level: around half of the respondents thought that funding should be based on national solidarity. This result may be explained by the fact that the coast is generally considered as a common asset, and therefore that the cost of its protection should be borne by the State and the local authorities (with European co-funding which is often significant). Implicitly, this means choosing a social insurance scheme wherein the individual premium does not depend on the individual risk. Individuals who are at no or low risk contribute to funding the insurance or the protection of individuals at high risk. However, social funding of flooding risk was rejected by 12% of respondents who felt that individual insurance cost should reflect the risk level. It should be noted that the results concerning public and private assets were broadly similar. Only 5% of respondents opted for non-solidaristic funding of public assets and wanted the towns at risk to bear alone the cost of managed retreat policies. 19% of respondents preferred a funding system based on local solidarity (whether at departmental or regional level) as the town at risk is part of a larger economic and institutional area whose components and members are considered to be legitimate contributors. This funding

Table 3
Demographic characteristics of the sample.

Gender	Male	54%
	Female	46%
Family	Living as part of a couple	46%
	Not living as part of a couple	54%
Age	Mean	53 years
	Median	58 years
Education	<Baccalaureate	30%
	Baccalaureate	24%
	>Baccalaureate	46%
Income (monthly)	Mean	2570€
	Median	2500€
Home	Tenant	27%
	Owner	73%

Table 4
Preferences for the funding of managed retreat policy (total of 1st and 2nd choices).

	Zone N (% of the zone sample)					
	Public assets			Private assets		
Funding mechanism	Coast	Hinterland	Total	Coast	Hinterland	Total
National taxes	83 (35.47)	87 (32.84)	170 (33.8)	82 (34.89)	77 (28.52)	159 (31.49)
National tax for climate change adaptation	38 (16.24)	51 (18.96)	89 (17.69)	35 (14.89)	37 (13.70)	72 (14.26)
National solidarity sub-total	121 (51.71)	138 (51.30)	259 (51.49)	117 (49.79)	114 (42.22)	231 (45.74)
Regional and departmental taxes	38 (16.24)	35 (13.01)	73 (14.51)	23 (9.79)	23 (8.52)	46 (9.11)
Regional tax for climate change adaptation	12 (5.13)	13 (4.83)	25 (4.97)	14 (5.96)	24 (8.89)	38 (7.52)
Regional or departmental sub-total	50 (21.37)	48 (17.84)	98 (19.48)	37 (15.74)	47 (17.41)	84 (16.63)
Tourist tax	55 (23.50)	67 (24.91)	122 (24.25)	47 (20)	46 (17.04)	93 (18.42)
Local taxes of coastal towns	8 (3.42)	16 (5.95)	24 (4.77)	13 (5.53)	23 (8.52)	36 (7.13)
Private insurance for individuals	–	–	–	21 (8.94)	40 (14.81)	61 (12.08)
No-solidarity sub-total	63 (26.92)	83 (30.86)	146 (29.03)	81 (34.47)	109 (40.37)	190 (37.62)
Total	234 (100)	269 (100)	503 (100)	235 (100)	270 (100)	505 (100)

Note: the table above shows the responses to the two following questions: 'What seems to you the fairest way to finance relocation of public assets?' and 'What seems to you the fairest way to finance and compensate private assets (housing and activities)?' For each question, respondents had to select from a list the two options that were deemed to be the priority.

system represents a hybrid model between national solidarity and no solidarity at all. Although it does imply that individuals at low risk subsidise those at high risk, limiting this solidarity to the local level might be interpreted as a counterpart for the positive externalities (e.g. recreational services) and the positive economic impact generated by beaches in the territory as a whole. The choice of a tourist tax (24% of respondents for public and 18% for private assets) follows the same logic where individuals who benefit from a resource contribute to its funding, independently of the risk factor. Thus a hybrid funding model may be defined based on the contribution of those who benefit directly or indirectly from the resource regardless of their risk level (regional or departmental solidarity and tourist tax). Such a model was supported by 43% of respondents in the case of the managed retreat of public assets and by 36% in the case of private property.

4.2. Pluralism of Distributive Judgements for the Compensation Criteria

Currently in France, compensation for a one-off managed retreat operation, as with any other territorial development, is based on market price. If a significant managed retreat policy were envisaged, specific criteria may be required. Given the increasing importance of the responsibility principle, owners informed at the time of their purchase could be compensated at a lower rate. This option, which is consistent with the new responsibility approach in solidarity policies, was only ranked third by the respondents (Table 5). Over half of them preferred to distinguish and advantage main residents or to maintain the general utility principle of compensation based on market price. Other criteria were more marginal even though they represented about a third of respondents.

The correlations of this question with socio-demographic characteristics show that those who chose to take into account informed residents' responsibility had higher incomes (>€3000 per month) and tended to reject solidarity in funding. People with high incomes also tended to choose compensation at market price whilst those with the

lowest incomes (<€1300 per month) preferred to use income of those to be compensated and the length of time spent in the residence as the key criteria. Furthermore, there is some coherence in the respondents' distributive judgments as a greater number of them favour funding managed retreat policies at a local level whilst also choosing to base compensation on the responsibility criterion.

In addition to elicit the equity judgments related to compensation criteria, the survey seeks to test empirically the acceptance of the four general principles of justice that can be used to define fair managed retreat policies. The results are shown in Table 6. The distribution of the responses is consistent with empirical studies of distributive preferences which show that generally individuals do not refer to a single justice principle but, on the contrary, base their distributive judgement on numerous criteria (Cappelen et al., 2007; Traub et al., 2005).

Finally, respondents were asked to give their opinion, on a scale from "do not agree" to "fully agree", on various options to differentiate compensation. The Table 7 gives the results for the responsibility principle. It appears that over two-thirds of respondents (69%) agreed that this principle would be fair.

5. Discussion

The aim of the survey was to empirically study perceived fairness in managed retreat policies in order to investigate the social acceptability of such policies and to provide answers to three main questions. First, did respondents feel that flooding risk requires social cover invoking the principle of solidarity between those at-risk and not-at-risk? Our survey shows that, for managed retreat policy funding, half of the respondents support the risk-insensitive solidaristic model in which a universal levy is collected on all individuals based on the general principle of cross-subsidisation between those who are and those who are not at risk. This main result calls for two remarks. First, the equity-oriented view of funding is confirmed by the preferences concerning compensation criteria: 42% of respondents chose compensation criteria that gave

Table 5
Preferences concerning compensation criteria (total of 1st and 2nd choices).

Compensation criteria	Zone N (% of the zone sample)		
	Coast	Hinterland	Total
Type of housing (in favour of main residence): priority to the worst-off	78 (33.33)	78 (29)	156 (31.01)
According to the market value of assets: efficiency principle and priority to property rights	72 (30.77)	78 (29)	150 (29.82)
Date of purchase (at the expense of informed owners): responsibility principle	32 (13.68)	41 (15.24)	73 (14.50)
Owner's income (in favour of lower incomes): priority to the worst-off	26 (11.11)	38 (14.13)	64 (12.72)
Date of purchase (in favour of longer-term owners): attachment	24 (10.26)	28 (10.41)	52 (10.34)
Other or no answer	2 (0.85)	6 (2.23)	8 (1.59)
Total	234 (100)	269 (100)	503* (100)

Note: the following question was asked: 'If houses and shops near the beaches were to be expropriated, in your opinion what would be the fairest compensation criteria?' respondents had to select from a list the two options that were deemed to be the priority.

Table 6
General justice principles considered to be the fairest in managed retreat policy (total of 1st and 2nd choices).

General justice principles	Zone N (% of the zone sample)		
	Coast	Hinterland	Total
Efficiency :	80 (33.20)	69 (25.56)	149 (29.16)
The greatest collective benefit per euro spent			
Equity :	47 (19.50)	62 (22.96)	109 (21.33)
Taking into account people worst-off in terms of income			
Responsibility:	56 (23.24)	75 (27.78)	131 (25.64)
People informed of the risks are responsible for their decisions			
Solidarity:	55 (22.82)	61 (22.59)	116 (22.70)
Solidarity of all faced with a risks which will affect only a few			
Other or no answer	3 (1.24)	3 (1.11)	6 (1.17)
Total	241 (100)	270 (100)	511 (100)

Note: the following question was asked: ‘Which criteria do you consider the fairest in implementing managed retreat policies?’ Respondents had to select from a list the two options that were deemed to be the priority.

priority to the worst-off whereas the efficiency principle was chosen only by about one third (29%) of respondents. This trade-off between equity and efficiency was also reflected in the responses to the general question concerning fair managed retreat policies (Table 6): principles of solidarity and of equity were favoured by 43% of the respondents, compared with 30% for the efficiency principle. The second remark is that there remains some room for risk-differentiation, i.e. for a funding model other than the solidaristic one with a universal levy. It should be emphasised that a council-tax-based funding model is a way to introduce risk-differentiation within a universal solidaristic model. On this issue, one limitation of our survey is that the universal solidaristic and the council-tax-based models were presented as two competing approaches to the funding of managed retreat policies whereas they may be complementary, with the latter allowing for risk-differentiation.

The second question that was addressed sought to elucidate the extent to which the notion of individual responsibility associated with an informed choice of an at-risk location was reflected in the respondents' view of fairness. A quarter of respondents chose the responsibility principle³ when it was presented as a general principle of justice characterising fair managed retreat policies (Table 6). However this principle was selected by only 14% of respondents as one of the two fairest compensation criteria⁴ (Table 5). This difference between people 'support for the responsibility principle depending on whether it is embedded in a general principle of justice or in a particular compensation scheme relates to the theoretical discussion of the responsibility principle itself and paves the way for further work. According to the responsibility principle people should not be compensated for unfavourable outcomes originating from informed choices or voluntarily-accepted risk, regardless of the level of costs and damages. Then, one of the major challenges of including responsibility into justice theories comes from the fact that this principle may possibly conflict with other important ethical values such as the guarantee of a minimum level of income or capabilities for all individuals. This criticism of luck egalitarianism is called the Harshness Objection (Fleurbaey, 1995). It could be that this limit to the principle of responsibility becomes more obvious to respondents in the survey when it is used as the basis for a compensation criterion.

Within the framework of international climate justice, Klinsky et al. (2012) examine the public perceptions of justice in funding adaptation and show that the responsibility argument is only mentioned by respondents in the case of wealthy cities in order to justify a greater contribution to funding adaptation costs by residents who are informed of the risk. In the context of national managed-retreat policies, our study

highlights the fact that in order to gauge the importance of the responsibility principle in the distributive judgments of individuals, it is necessary to clarify *up to what level* this principle applies in compensation policies. A promising way to explore this issue could be to present to the respondent distributive dilemmas involving trade-off between responsibility on the one hand and the existence of a minimum compensation threshold through a social insurance scheme on the other. This question is all the more relevant that the survey shows that over two-thirds of the respondents agree on the proposal that it is fair to introduce the responsibility principle in the compensation scheme.

The third question addressed by the survey concerns the capacity of respondents to give an impartial view. In empirical studies on individuals' conceptions of equity, one of the main issues is to know to what extent people choose equity criteria independently of their personal situation. In the context of international climate justice, the issue of self-serving bias in the distributive judgments of individuals is documented by two recent studies. Carlsson et al. (2011) focus on the choice of ‘effort-sharing rules’ in the mitigation problem. By comparing two treatments depending on whether or not the name of the country was disclosed to the respondents, they found out that people did not necessarily select the rules that helped their own country. Klinsky et al. (2012) reach the same conclusion in the context of adaptation. Subjects were asked to set priorities between communities for receiving adaptation funding from their personal perspective first and then from the perspective of a representative from an international funding body. In the first treatment, 2/3 of participants ranked their home-town first whereas in the perspective of a third party, the ranking was no longer reflecting this partiality to their own community.

The survey seeks to contribute to this issue in the context of managed retreat policies. To that end, two population zones were surveyed in order to characterise personal preferences and those of an impartial observer. Coastal inhabitants were stakeholders in retreat policies and were likely to be affected by the self-serving bias whereas people who live in the hinterland were not. The objective was to explore whether the equity criteria selected by individuals differed according to the survey area, with the assumption that the perceptions of people living in the hinterland stand for impartial views as they were third parties not implicated in retreat policies.

We tested the link between the residence area (coast or Hinterland) and the answers given to the justice principles questions using chi-

Table 7
Respondents' perceptions concerning the proposition that the use of public funds to compensate inhabitants who were informed of the risks incurred is unfair.

	Completely disagree	Tend to disagree	Tend to agree	Completely agree	Don't know	Total
N (%)	21 (8)	47 (18)	100 (39)	78 (30)	12 (5)	258 (100)

³ MacNemar's test shows that the proportion of respondents who chose the responsibility principle as the first fairest principle and as the second fairest principle is the same.

⁴ MacNemar's test shows that people's support for the responsibility principle is concentrated on the second fairest choice

square tests. In the first place, it appears that even if there is no link between the first or second choice of ways of funding the preservation of public assets and the residence area, this is not the case for private goods. Choosing a national tax ($p = 0.10$), a local tax ($p = 0.15$) and notably a private insurance ($p = 0.05$) as a first or a second choice is indeed significantly linked to the residence area. Thus, coastal residents are under-represented in the respondents choosing the private insurance and the local tax, whereas they are significantly much more in favour of a national tax. Finally, the results show that choosing 'Efficiency' ($p = 0.05$) or 'Responsibility' ($p = 0.15$) as a first or a second choice for the general principles of justice in managed retreat policies also depends on the residence area. People living in the hinterland favour the responsibility principle and are under-represented in the respondents choosing the efficiency principle.

6. Conclusion

To conclude, it is important to stress that, as in the case of sharing the cost of emission reductions or climate change adaptation, our survey confirms the impact of the context on people's distributive preferences and hence the importance of studying this issue. Nevertheless, further work is necessary to operationalise the equity criterion and assist managers to make choices when they attempt to enhance the social acceptability of these policies. Against a background of the end of the Welfare State and reduced public spending, this support to public decision-making is crucial. In France, these issues are currently a great concern for the State services and an experimental programme of relocation policies in five pilot sites has been developed (MEDDTL, 2012) which raises questions concerning the compensation principles and arrangements. It would be of particular interest to develop this analysis by exploring individuals' preferences concerning implementation arrangements for the responsibility principle and to pursue empirical studies developing distributive situations which would integrate, at an operational level, several compensation and responsibility tiers.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at <http://dx.doi.org/10.1016/j.ecolecon.2015.09.005>.

References

- Abel, N., Gordard, R., Harman, B., Leitch, A., Langridge, J., Ryan, A., Heyenga, S., 2011. Sea level rise, coastal development and planned retreat: analytical framework, governance principles and an Australian case study. *Environ. Sci. Pol.* 14, 279–288.
- Anderson, E., 1999. What is the point of equality? *Ethics* 109, 287–337.
- Arneson, R., 1989. Equality of opportunity for welfare. *Philos. Stud.* 56, 77–93.
- Atkinson, G., Machado, F., Mourato, S., 2000. Balancing competing principles of environmental equity. *Environ. Plan. A* 32 (10), 1791–1806.
- Babcock, L., Loewenstein, G., 1997. Explaining bargaining impasse: the role of self-serving biases. *J. Econ. Perspect.* 11 (1), 109–126.
- Boateng, I., Bray, G., Bray, M., 2007. Comparative Merits of Adaptation Policies of Sea Level Rise and Their Potential Impacts on Coastal Settlements in Developing Countries. *Colloque Strategic Integration of Surveying Services*. Hong Kong SAR, China 13–17 may 2007 (16 pp.).
- Cai, B., Cameron, T.A., Gerdes, G.R., 2010. Distributional preferences and the incidence of costs and benefits in climate change policy. *Environ. Resour. Econ.* 46, 429–458.
- Caney, S., 2005. Cosmopolitan justice, responsibility and global climate change. *Leiden Journal of International Law*. 18, 747–775.
- Cappelen, A., Hole, A., Sørensen, E., Tungodden, B., 2007. The pluralism of fairness ideals: an experimental approach. *Am. Econ. Rev.* 97 (3), 818–827.
- Cappelen, A., Konow, J., Sørensen, E., Tungodden, B., 2013. Just luck: an experimental study of risk-taking and fairness. *Am. Econ. Rev.* 103 (4), 1398–1413.
- Carlsson, F., Kataria, M., Lampi, E., Lofgren, A., Sterner, T., 2011. Is fairness blind? The effect of framing on preferences for effort-sharing rules. *Ecol. Econ.* 70, 1529–1535.
- CGDD, 2011. Impacts à long terme du changement climatique sur le littoral métropolitain. *Etudes et Documents n° 55*, Octobre 2011 (70 pp.).
- Cohen, G.A., 1989. On the currency of egalitarian justice. *Ethics* 906–944.
- Cooper, J.A.G., Lemkert, C., 2012. Extreme sea level rise and adaptation option for coastal resort cities: a qualitative assessment from the gold coast Australia. *Ocean Coast. Manag.* 64, 1–14.
- Cooper, J.A., McKenna, J., 2008. Social justice in coastal erosion management: the temporal and spatial Dimensions. *Geoforum* 39, 294–306.
- Cooper, J.A.G., Pile, J., 2014. The adaptation-resistance spectrum: a classification of contemporary adaptation approaches to climate related coastal change. *Ocean Coast. Manag.* 94, 90–98.
- Dana, R., Weber, J., Kuang, X., 2007. Exploiting moral wiggle room: experiments demonstrating an illusory preference for fairness. *Economic Theory* 33, 67–80.
- Dutt, V., Gonzales, C., 2012. Decisions from experience reduce misconceptions about climate change. *J. Environ. Psychol.* 32 (2012), 19e29.
- Dworkin, R., 1981. What is equality? Part 2: equality of resources. *Philos. Public Aff.* 10, 283–345.
- Favarelli, M., 2007. How context matters: a survey-based experiment on distributive justice. *J. Public Econ.* 91, 1399–1422.
- Fleurbaey, M., 1995. Equal opportunity or equal social outcome? *Econ. Philos.* 11, 25–55.
- Fleurbaey, M., 2008. Fairness, Responsibility, and Welfare. Oxford University Press.
- Gibbs, M.T., Thebaud, O., Lorezn, D., 2013. A risk model to describe the behaviours of actors in the houses falling into the sea problem. *Ocean Coast. Manag.* 80, 73–79.
- Glenk, K., Fisher, A., 2010. Insurance, prevention or just wait and see? Public preferences for water management strategies in the context of climate change. *Ecol. Econ.* 69, 2279–2291.
- Grasso, M., 2010a. An ethical approach to climate adaptation finance. *Glob. Environ. Chang.* 20, 74–81.
- Grasso, M., 2010b. The role of justice in the south–north conflict in climate change: the case of negotiations on the adaptation fund. *Int. Environ. Agreements* 10, 361–377.
- Harsanyi, J., 1955. Cardinal welfare, individualistic ethics and interpersonal comparisons of utility. *J. Polit. Econ.* 63, 309–321.
- Johansson-Stenman, O., Konow, J., 2010. Fair air: distributive justice and environmental economics. *Environ. Resour. Econ.* 46, 147–166.
- Kelly, P.M., Adger, W.N., 2000. Theory and practice in assessing vulnerability to climate change and facilitating adaptation. *Clim. Chang.* 47 (4), 325–352.
- King, D., Bird, D., Haynes, K., Boon, H., Cottrell, A., Millar, J., Okada, T., Box, P., Keogh, D., Thomas, M., 2014. Voluntary relocation as an adaptation strategy to extreme weather events. *Int. J. Disaster Risk Reduct.* 8, 83–90.
- Klinsky, S., Dowlatabadi, H., 2009. Conceptualizations of justice in climate policy. *Clim. Pol.* 9, 88–108.
- Klinsky, S., Dowlatabadi, H., McDaniel, T., 2012. Comparing public rationales for justice trade-offs in mitigation and adaptation climate policy dilemmas. *Glob. Environ. Chang.* 22, 862–876.
- Konow, J., 2001. Fair and square: the four sides of distributive justice. *J. Econ. Behav. Organ.* 46 (2), 137–164.
- Konow, J., 2003. Which is the fairest one of all? A positive analysis of justice theories. *J. Econ. Lit.* 11, 1188–1239.
- Konow, J., 2009. Is fairness in the eye of the beholder? An impartial spectator analysis of justice. *Soc. Choice Welf.* 33 (1), 101–127.
- Lange, A., Vogt, C., 2003. Cooperation in international environmental negotiations due to a preference for equity. *J. Public Econ.* 87 (9–10), 2049–2067.
- Lange, A., Loschel, A., Vogt, C., Ziegler, A., 2010. On the self-serving use of equity in international climate negotiations. *Eur. Econ. Rev.* 54 (3), 359–375.
- Lecacheux, S., Pedreros, R., Devallée, E., Poisson, B., Garcin, M., 2011. Evaluation simplifiée de la submersion marine à l'échelle du Languedoc-Roussillon. *Rapport final ANR Projet Miseen*.
- Magnier, A., 2013. Cartographie de l'aléa submersion marine dans le golfe du lion. Etude de deux sites pilotes dans le cadre du projet SOLTER. *Rapport Master Pro Gestion des catastrophes et des risques naturels*. Département de Géographie, Université Paul Valéry Montpellier (86 pp.).
- MEDDTL, 2012. Stratégie nationale de gestion intégrée du trait de côte. Vers la relocalisation des activités et des biens. *Rapport* (20 pp.).
- Miller, D., 2008. Global Justice and Climate Change: How Should Responsibilities be Distributed? *The Tanner Lectures on Human Values*.
- Myatt, L.B., Scrimshaw, M.D., Lester, J.N., 2003. Public perceptions and attitude towards a forthcoming managed realignment scheme: freiston shore, Lincolnshire, UK. *Ocean Coast. Manag.* 46, 565–582.
- Nozick, R., 1974. *Anarchy, State and Utopia*. Oxford, Blackwell.
- Paavola, J., Adger, W.N., 2006. Fair adaptation to climate change. *Ecol. Econ.* 56, 594–609.
- Pfister, H.R., Böhm, G., 2001. Decision Making in the Context of Environmental Risks. In: Allwood, C., Selart, M. (Eds.), *Decision Making: Social and Creative Dimensions*. Kluwer Academic Pub., pp. 89–111.
- Pilkey, O., 1990. A time to look back at beach nourishment, editorial. *J. Coast. Res.* 6 (1), iii–vii.
- Pye, K., Blott, S.J., 2006. Coastal processes and morphological change in the dunwich-sizewell area, Suffolk, UK. *J. Coast. Res.* 22 (3), 453–473.
- Rawls, J., 1971. *A Theory of Justice*. Cambridge, Mass. Cambridge Univ. Press.
- Rey-Valette, H., Rulleau, B., Meur-Ferec, C., Flanguart, H., Hellequin, A.P., Sourisseau, E., 2012. Les plages du littoral languedocien face au risque de submersion : définir des politiques de gestion tenant compte de la perception des usagers. *Géog. Econ. Soc.* 14, 379–391.

- Ringius, L., Torvanger, A., Underdal, A., 2002. Burden sharing and fairness principles in international climate policy. *Int. Environ. Agreements*. 2, 1–22.
- Roemer, J., 1993. A pragmatic theory of responsibility for the egalitarian planner. *Philos. Public Aff.* 22, 146–166.
- Schokkaert, E., Gaertner, W., 2011. *Empirical Social Choice: Questionnaire-Experimental Studies on Distributive Justice*. Cambridge University Press.
- Shue, H., 1993. Subsistence emissions and luxury emissions. *Law Policy* 15 (1), 39–59.
- Traub, S., Seidl, C., Schmidt, U., Levati, M., 2005. Friedman, Harsanyi, Rawls, Boulding, or somebody else? An experimental investigation of distributive justice. *Soc. Choice Welf.* 24, 283–309.
- Tungodden, B., 2003. The value of equality. *Econ. Philos.* Issue 1:1–44.
- Turner, K., 2007. Limits to CBA in UK and European environmental policy: retrospects and future prospects. *Environ. Resour. Econ.* 37, 253–269.