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The political economy of public participation in natural hazard decisions – a theoretical review and an exemplary case of the decision framework of Austrian hazard zone mapping

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Abstract. It is often argued whether public good decisions with a high degree of uncertainty, such as public decisions for the prevention against natural hazards are, should be solely left to be taken by expert bodies. Imperfect knowledge of experts may leave an uncertain level of risk to the public or the affected groups of persons or expert decisions might not reflect the affected parties' preferences in whose interest they should ideally act. Direct participation of affected parties in such decisions is believed to be valuable in many ways. On the one hand, it allows final decision makers' choices to be more accepted among stakeholders and on the other hand, knowledge by the experts can be complemented with the one by affected parties. From a political economic viewpoint it will be discussed in the present paper whether this process can be viewed to provide a "better" decision-making process by looking at an exemplary case of danger zone planning in Austria.

1 Introduction

The management of natural hazards poses numerous challenges to decision makers in developing as well as developed countries. Naturally, states' resources are restricted, thus a full protection cannot be achieved since opportunity costs of a zero-risk level would be too high, therefore the allocation of all funds towards this aim inefficient. Avoiding catastrophes by settling in non hazardous areas also implies in most of the cases considerable opportunity costs: in less developed areas people are dependent on settling close to e.g. water catchment areas since they cannot afford other infrastructure arrangements. In more developed countries, settling areas become more and more scarce, thus fled, at least within the region, is no option. The questions that arise in the later

case are: what protection level do we want to achieve? What remaining risk do we accept? How do we allocate our budgets? Above all, the question is: who is to decide on these issues?

Certainly, experts are most suitable to tell us, from a technical viewpoint, what types of measures are needed to support a certain risk level. On the other hand, only occasionally do technical experts decide about where to install these measures first. Usually, politicians or bureaucratic units take over these public good decisions. Some protective measures can be partly characterised as public goods since e.g. large dams against flooding in city landscapes are characterised by the non-exclusivity and non-rivalry principle (Frey and Kirchgässner, 2002), therefore the market mechanism would cause an undersupply potentially increasing the consequences of a natural catastrophe. Problems arise if public good decisions are not in line with the preferences of the affected parties: in spring 2006 Dürnkrot (a village in Lower Austria) was severely destroyed by a coincidence of heavy rain falls and an intensive thawing period. According to a newspaper article (Profil, 2006), decision makers were aware of the fact that protective measures in this village stem from the early 1940's that could not hold a flood event of this size. The outrage among the population was huge when this fact became public. In economic terms, these issues are usually referred to as principal-agent problems, whereby the voters or affected parties can be seen as principals and politicians as agents who have to serve in the interest of their voters.

The decision makers in the above case argued that they tried to install new protection measures already in 1997 but could not succeed because current property owners, who were mostly farmers, did not agree to re-allocate their farm lands (they were offered new areas and/or a compensation for losses in case of a flood event). In order to avoid such catastrophes and negative consequences of decisions for protection ahead of it, it is often argued that some sort of conflict resolution is needed. In the literature it is argued that direct

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public participation can resolve especially conflicts around the environment (De Marchi and Ravetz, 2001; Bloomfield et al., 2001; Beierle and Konisky, 2001; Renn et al., 1995; Messner et al., 2006). In political economic terms, it is a way to directly reflect people's preferences in a decision process through which more consensual solutions might be found (Buchanan and Tullock, 1962; Frey and Kirchgässner, 1993) and if not, voting can still be put in place whereby the outcome, it is argued, still reflects a more acceptable solution compared to not having discussed the issue at the outset (Bohman and Rehg, 1997). In the end, it provides decision makers with better understanding of the preferences. These are at first taken into account of bureaucratic experts' considerations. Following this though is ultimately of benefit for politicians as well. They are also made liable for wrong decisions about the allocation of public funds, so participation could help increase chances to stay in office for the next electoral period.

Advantages of public participation have been recognised in many areas of public decision-making in Europe, especially for the environment and is mentioned in many national laws as well EU core documents (e.g. DETR, 1998; European Commission, 1998). Participation in this context is not solely defined as in voting, e.g. in public referenda, but especially in other forms, like e.g. bringing in appeals, initiatives, discourse elements etc. In that sense, the definition by Renn et al. (1995) can be followed who define participation as "forums for exchange that are organised for the purpose of facilitating communication between government, citizens, stakeholders and interest groups, and businesses regarding a specific decision or problem" (p. 2).

In Austria, public participation has a long tradition in spatial planning, of which hazard zone planning for the prevention against risks from natural hazards forms a part. This case is especially interesting because technical experts (which will be referred to as bureaucrats in this paper since their offices show the characteristics of agencies, being budgetary dependent on politicians' decisions and having a mission to provide public goods "protection measures") are the ones who draft and decide (in a commission with other decision makers) upon hazard zone maps, but still integrate elements of public participation in the decision process.

The present paper attempts at understanding the reasons for bureaucrats to actually incorporate participatory elements in their decisions even though they are neither obliged to do so nor can be sanctioned in case they ignore such elements. Political economic and related literature will be reviewed to propose an understanding of why participation could make decisions on the prevention of natural hazards more efficient. It is necessary to increase the scientifically profound recommendations for the legitimacy of public participation in order to make it become part of the general democratic framework – something which has been striven for in this stream of research for some time. This goal is increasingly becoming realistic since voters in many democratic countries realise

that representation in parliaments should not be the only way for integrating people's preferences after all. Bloomfield et al. (2001) draw out that policy makers are not regarded as the only source for complex social and environmental problems; Spash (2001) points at environmental political parties not having sufficient influence and according to Bohman and Rehg (1997) people feel more misaligned with governments' decisions.

The analysis of the behaviour of bureaucrats as experts is most important since they are the ones who have a crucial influence on the effect of participation. The incentive-structure of them can offer an insight in the understanding of the form of participation and its possible influence on decision processes. Therefore, the economic assumptions of principal-agent problems build the basis of analysis in this paper, especially in relation to other decision variables, such as direct participation from the affected parties.

The paper is structured as follows: An overview of economic models of bureaucracy will form the basis for the evaluation of public participation in low-probability-high-loss events. This is followed by looking at an exemplary case of such a risk, namely hazard zone planning against natural hazard events in Austria, in order to understand the theoretical implications for the incentives of the relevant parties to incorporate public participation into the decision process. By asking how the propositions from experts and lay people could actually deviate from one another, conclusions will be drawn on how theoretical foundations so far can support the successful implementation of such processes in practice.

2 Bureaucrats versus the public – theoretical assumptions

2.1 Economic models of bureaucracy

As already mentioned a state's budget for the allocation of resources towards the prevention of natural hazards is limited. Usually, it is the politicians that ideally decide in the interest of their voters about how much of the overall budget should be allocated towards this prevention and the task to actually distribute this money among the endangered regions is delegated to an experts' bureau (who will be referred to as bureaucrats in the following as already explained above). The work of the latter is economically argued to be a source of inefficiencies resulting in organisational slack and over-supply of the respective public good. Such problems are referred to as principal-agent problems. In the case where the voters are the principal and the politicians the agents, divergences arise between what voters prefer as the optimal allocation and what politicians actually do. For example, natural catastrophes affecting settlements are per se events that shed negative lights on the authorities responsible for their prevention and are thus one reason why their consequences are enforced to be minimised. Thus, a more lavish approach

to budget spending could be assumed. On the other hand, politicians are the first ones to emphasise their support after such an event (Prime Minister Gordon Brown after the recent flood events in the United Kingdom is just one example) in order to gain sympathy among their voters. When politicians take up the role of principals and bureaucrats are the agents, other problems arise, first and foremost the one of asymmetric information. Conflicts arise between the bureaucrats who seek for promotions and for funds in competition with other bureaus and principals who focus on obtaining votes.

Unlike early sociological viewpoints of bureaucrats as specialised administrative functions that follow “purely objective considerations” (Weber, 1978, p. 975, cited in Gullis and Jones, 1993, p. 86), they are assumed to act as rational individuals (*homo oeconomicus*) that do not exclusively serve the public interests, but even more so their own (Kirchgässner, 1991). In maximising their individual benefits, it is believed that their direct and indirect income, their reputation, their fringe benefits, their job safety as well as their quiet lives are positive sources of utility (Downs, 1967; Frey and Kirchgässner, 2002, summarise main variables of respective bureaucracy models). Instead of either maximising an organisation’s profit (as a manager in the private sector where personal income is dependent on the firm’s profit) or aiming at professional excellence (as a manager of an NGO who gains benefits from increased power, status and prestige), bureaucrats are not expected to be interested in achieving output efficiently since it is assumed that there are no personal gains for them behind this goal. Among others, like e.g. good reputation, a bureaucrat conducts routine work and will look for an undisturbed work-life thus avoiding conflict with his superiors (Weck-Hannemann, 1982).

First economic models of the behaviour of public bureaucrats have been developed by Niskanen (1968, 1971, 1975) whose general assumptions are that bureaucrats seek to maximise the budget of their bureau as well as produce larger-than-optimal output. Other assumptions that e.g. bureaus are monopoly suppliers of their service or that bureaucrats hold no personal income share from a possible surplus also need to be considered when looking at the first model of Niskanen in terms on budget maximisation.

One important re-consideration of Niskanen’s model is that the assumption about budget- and output-maximising behaviours of bureaus only partly hold true. Instead, Migué and Bélanger (1974) propose that bureaus do not necessarily seek to maximise output (in any case they argue that bureaus are always too large and output is not in terms of pareto-efficiency), but rather the discretionary budget available to them. This budget is one that is neither allocated for producing more output nor to enhance their own salaries but rather an extra budget that allows them to gain in fringe benefits and in scope of deciding according to their own judgement, thus positive sources of their own personal utility. Both models assume that agencies are not controlled or have any restrictions, in the extreme case assuming bureaucracy act-

ing as a Leviathan (Weck-Hannemann, 1982). The scope of discretion is said to increase the larger the distance between the principal(s) preferences and those of the agents (Langbein, 2003). Discretion is furthermore larger the more general the policy is formulated to the agencies (Epstein and O’Halloran, 1999). Migué and Bélanger show that discretion consequently leads to inefficiency not only in the allocation, but also in the production of agencies (Weck-Hannemann, 1982).

A different strand of literature argues that disagreement among multiple principals leads to a reduction in agencies’ discretion (e.g. Moe 1990) since more rules and monitoring systems are installed that increase transaction costs and therefore inefficiency. Such a monitoring rule can be observed in the case of hazard zone planning in Austria, where the bureau may not take the final decision on its own, but rather decides in a commission, where, among others, also representatives of the principal (ministerial delegates) place their vote in the final decision. Principals are believed to control agents’ behaviour as long as marginal benefits are not lower than marginal costs (Breton and Wintrobe, 1975).

The consequences of discretion can either be agents that deviate in their behaviour from the expectations of their principals (Brehm and Gates, 1997). Monitoring, again, and incentive systems can reduce scope for agents’ rent seeking. Furthermore, careful selection of agents can help overcome this problem (Langbein, 2003).

Langbein (2003) argues that most of these principal-agent models view preferences of principals as exogenous from the agent’s viewpoint. Nonetheless, she states, some agents can influence the principals preferences thus control their own agendas. This might especially apply to highly technical tasks of agencies, such as is the above-mentioned case. All together, a differentiated analysis needs to be undertaken when looking at discretion since it can either enhance or decrease efficiency of a bureau’s work.

2.2 High expertise tasks by bureaucrats

These basic economic models on output, budget and discretion variables can be further extended to an agency type that is responsible for high expertise tasks. In such a case, asymmetric information between bureaucrats (or experts) and principals can be even larger.

Raschky (2006) goes a step further towards what is of specific interest for the present paper and analyses bureaus that are responsible for Low-Probability-High-Loss events, e.g. responsible for the implementation of the socially optimal amount of preventive measures against natural hazards. The author shows that for these bureaus it is characteristic to have higher inefficient supply than normal bureaus and that “additional governmental funds and responsibilities for the agency increase these allocative inefficiencies” (p. 14) to an even larger extent. It is interesting to evaluate why budgets on protective measures against natural hazards are spent

lavishly and to deduce this behaviour from the outlined models. However, the present paper tries to evaluate the influence of the participatory element in the decision process on the behaviour of the bureaucrat.

2.3 Bureaucrats faced with uncertainty

Risk-averse behaviour can be observed in uncertain decision contexts (e.g. the degree to which natural catastrophes can be foreseen by experts, i.e. the bureaucrats) in two ways. Above all, principal's reasons for delegating risky tasks might lie in the fact that they avoid being blamed for costs (Moe, 1997) or the negative outcomes of projects (Fiorina, 1982a, b: shift-the-responsibility-model). As a consequence, principals will delegate delicate tasks as long as the marginal benefits from not being blamed outweigh the marginal costs of not claiming the credits for successful completion of tasks (Moe, 1997). In an uncertain environment, agents can be hesitant in fulfilling the tasks their principals would want them to undertake. Mueller (2003) cites two examples where bureaucrats were in the first case hesitant to certificate a new range of drugs expecting the potential negative effects they might incur. In another example bureaucrats were reluctant to invest in a city infrastructure project expecting possible criticism for failure. Both cases show a certain risk-averse behaviour of bureaucrats. These two cases can be characterised as high-cost decisions as defined by Kirchgässner (1991), whereby the effect of these may have directly or indirectly negative impacts for bureaucratic experts. In many cases, Kirchgässner (1991) argues, bureaucrats are confronted with low-cost decisions whose impacts may have no consequence for their own utility, which means there may not be an incentive for them to take decisions in the interest of the public, therefore the installation of as many high-cost decision contexts for bureaucrats is suggested by Kirchgässner (1991) or at least the introduction of other soft economic incentive schemes put forward. If risk-aversion is assumed, high-cost decisions are expected to lead to a thorough consideration of the decision at hand, thereby taking all possible means (like e.g. public participation) for avoiding negative consequences into the account of their decision.

In order to avoid such situations, also *ex ante* and *ex post* control of agencies are suggested in the literature (e.g. Langbein, 2003), whereby the latter could be less desirable since e.g. consequences would be suffered from a natural catastrophe if protection measures failed. *Ex ante* control is suggested to focus on reducing asymmetric information by enacting institutional frameworks that induce positive or negative incentive mechanisms (Moe, 1997), thus a process oriented approach is suggested.

2.4 Bureaucrats confronted directly with the public

From the considerations above, some explanations or propositions can be derived for the behaviour of bureaucrats as

agents as well as politicians as principals in uncertain decision settings in general and for the exemplary case in Austria in specific.

The shift-of-responsibility-model of Fiorina (1982a) could mean that principals, i.e. politicians (representatives from the responsible ministry), delegate the task of hazard zone mapping to bureaucrats (who are technical experts), thus persisting with the possible credits they could claim from this task. The reason behind this – at the first sight seemingly irrational – behaviour could be the risk involved in the task itself, i.e. the fear of being blamed for damaging consequences of a catastrophe that has not been sufficiently planned for.

From the bureaucrats' point of view, there is no legal incentive of making decisions according to the interests of the affected parties in hazard zone mapping since they can not be made liable in the event of a catastrophe based on the current legal framework in Austria. Other incentives, such as the decentralised character of their decision responsibility may however be effective: bureaucrats draft plans for every municipality requiring one; therefore negative outcomes of their decisions could lead to direct accusation of these expert bureaucrats. This in turn could mean a loss in their reputation (which assumed to reduce their utility) and a more severe consequence, namely a possible shift to different bureaux, maybe involving less prestige or high social costs.

The introduction of public participation in the decision process of hazard zone planning might, in the light of these theories, be explained in various ways: first of all, principals (politicians) could seek *ex ante* control instruments of their agents' work. The participatory element could create an incentive for agents in terms of the barrier to act like a Leviathan. Secondly, the representation of public preferences in the decisions taken might enhance re-election chances for principals (as long as credits of these decisions are granted to them). Thirdly, from the bureaucrats' viewpoint, the incorporation of participatory processes might be a further shift in responsibility onto the affected parties so that in the event of a catastrophe not only bureaucrats but also affected parties can be blamed for the consequences. Moreover, bureaucrats might face negative consequences (e.g. shift in positions/bureaus) of their decisions. Therefore, they could be assumed to try to make as sound as possible decisions incorporating all the knowledge they can gather on top of their own expertise. Furthermore, they could try to work in line with the preferences of their principals (for whom participation might be a re-election enhancing instrument) because they are the ones who have power over their positions. Finally, according to the quiet-life proposition from above, bureaucrats could adhere to participation elements to gain acceptance for their jobs, thus have as little resistance as possible.

Let us now turn to the exemplary case and look at the framework of decision making in order to understand the possible consequences for public participation in practice.

3 A political economic analysis of the relevant actors in the process of hazard zone planning

3.1 General characteristics of hazard zone planning in Austria

Competences for typical natural hazards occurring in Austria are split amongst two national expert units, first and foremost because of financial reasons. These competences are regulated in Austria's private law (regulation on the hazard zone planning directive GZP-VO BGBl. Nr. 436/1976) as well as its forestry (§11, art. 1–8) and water construction and support law (Wasserbautenförderungsgesetz, 1985). All planning and protection issues concerning large flowing waters lie in the responsibility of Austria's Bundeswasserbauverwaltung (i.e. the water constructions authority). All large rivers, their retention and settlement areas, as well future planning around them are observed by this authority. All other risks stemming from nature, like mudslides, landslides, avalanches, torrents as well as rock falls or debris flows, belong to the competence of the WLW – Austrian service for torrent and avalanche control (i.e. the construction authority of protection measures against torrents and avalanches). The exact definition of the terms wide flowing waters and torrents is regulated in the danger zone directive (e.g. law on forestry, 1975, §99, art. 1–5). In line with this general division of competences goes the responsibility for hazard zone planning. Both authorities map their respective hazards separately from one another. In general, this is an acceptable procedure since oftentimes the effects are different amongst these two hazards. For example, if it rains over a longer period of time over a large area, then typically this increases the flood potential of large water flows. On the other hand, short and intensive rainfalls in one specific area usually increase the likelihood of torrents causing mud- or landslides.

In this paper we are only concerned with the sphere of competence of the WLW, the service for torrent and avalanche control, however potential conflicts between this authority and the one responsible for large flowing waters, the Bundeswasserbauverwaltung, poses some difficulties to the work of both (e.g. trouble spots arise on the frontiers between the two competence spheres that could possible cause for catastrophic outcomes after natural hazard events).

Returning to the authority for torrents and avalanches (in short WLW), one important characteristic is their direct subordination to the Ministry of the Environment or its subsection, the Ministry of land and forestry economy. The WLW is divided into a national authority, sections in each of Austria's federal states that are again, according to the size of this state, divided into regional offices. Apart from danger zone planning, each of the sections is also responsible for the planning and installation of protection measures against the above-mentioned hazards and the maintenance of these. Finally, they are the experts who have to be surveyors for specific issues of torrent and avalanche protections in pri-

vate cases (see law on forestry, 1975, §102, art. 5, paragraphs a–g).

Hazard Zone Planning plays two key roles, especially in a country like Austria, where settlement areas have become more and more scarce and natural hazards are given in the more levied areas and the Alpine landscapes as well in the plane surfaces, where large flowing waters coin the environment: on the one hand it indicates different sources and levels of risk for currently spatially relevant areas. Whereas massive reconstruction work was on the priority list above all after the Second World War, hazard zone planning has only become apparent since the 1970's. Not considering potentially hazardous areas, many settlements, e.g. buildings and other infrastructures had been built in areas exposed to avalanches, mudslides, flooding etc. Obviously, it would be politically unpopular to impose private as well as organisational owners of buildings the installation of protection measures for houses or infrastructures in retrospect. Protection measures are therefore installed on the basis of suggestion by bureaucratic experts through public funds based on a priority list. Historically, it is in dispute whether people avoided settling in endangered areas or whether they just lived being aware of the hazards and thus accepting the consequences of damages every now and then. Huber (WLW, Imst, personal communication, 2006) argues that people in Tyrol only began to settle close to the river Inn when protection measures were built.

Apart from the first full assessment of hazardous areas currently going on, hazard zone planning is an important basis for future spatial planning as well, so that new areas are only released for development projects in less hazardous zones, or alternatively released conditioned upon the instalment of private protection measures.

Austria's first hazard zone maps had been developed in the 1970's after the introduction of the legal requirement for them in the 1975's law on forestry. Most of the municipalities requiring such plans have already got one (in Tyrol 229 out of 272 and in Vorarlberg all of the 87; BMLFUW, 2006), however not all of these plans have been revised after their development in the 1970's and 1980's and therefore have a big backlog in terms of ongoing development and creation of protection measures during this period. Being aware of the increasing risk potential due to increased development in endangered areas and especially after the deadly avalanche catastrophe event in the Tyrolean municipality of Galtür in 1999 (where about 40 persons got killed), the Tyrolean law on land use planning, especially also its regulations from 1993 foresees the goal to revise all plans until the end of the year 2010. According to the responsible section of Tyrol, one expert can handle at most 2 hazard zone maps a year; Tyrol has about 72 and Vorarlberg about 39 fixed contract personnel (administration and experts).

The political pressure of judging the risk of natural hazards as accurately as possible can be observed in how adaptations to current zoning criteria like e.g. the avalanche risk measured in terms of snow pressure of 2.5 tons had been

decreased to 1 ton after the catastrophic avalanche event in Galtür, which means an increase in the red zone area. Apparently the uncertainty about where to fix risk levels from the expert side is considerable and adaptations reduce the risk of experts being blamed for the damages of a future event.

In general it can be said (Huber, WLV Imst, personal communication, 2006) that affected parties usually raise concerns over draft plans only if their personal properties are affected. The scarcer the settling area is, the greater is the interest of the affected parties or the private property owners in hazard zoning because the number of affected parties by yellow and red zones is likely to increase. As a consequence, a strong participating behaviour can be observed in the Austrian regions of Tyrol and Vorarlberg that are left with only few empty spaces to settle and surrounded by diverse natural hazards due to the natural landscape of mountains.

3.2 An analysis of the relevant actors in the decision process

It is important to describe the role of each of the actors in order to understand their support or rejection for participatory elements in the planning process. This understanding is crucial for the successful integration of participatory elements in decisions. Here, a comprehensive overview of all actors that are affected by or can affect the decision process shall be given.

The relevant actors in the process of hazard zone planning can be grouped as follows:

1. politicians (principals)
2. agents (bureaucrats, i.e. experts – WLV)
3. the WLV commission (consisting of the WLV drafter, the regional WLV unit director, a municipality representative, a ministry delegate, another expert from the federal government (optional))
4. voters (i.e. taxpayers; directly and indirectly affected parties of hazard zone maps)
5. interest groups (e.g. tourism industry)

3.2.1 Politicians (principals)

Already noted above, politicians are the ones who decide upon the amount of resources dedicated to the prevention of natural hazards and respective preventive measures (e.g. hazard zone maps). Again, deriving from the theories above, politicians seek to optimise their chances to stay in office. On the one hand they will enforce this by avoiding to be blamed for negative consequences of catastrophic events, on the other hand they will try to claim credits from good work of bureaucrats responsible for natural hazard prevention. On top of this, they also seek to gain in popularity by being overly present in case of catastrophes to show their function

as the “helping hand” benefiting from broad media coverage usually present at such times. This behaviour is furthermore enhanced the closer the election is to the catastrophic event (popularity function models show this sort of voting behaviour, e.g. in Mueller, 2003, whereby the myopic voter is the most extreme in that he or she votes considering the economic performance of the government shortly before the elections). As a consequence, the amount of resources dedicated to natural hazards increases considerably after catastrophic events. The proportion of resources allocated to areas that are in the media’s headlines is even higher, whereby consequently lesser is dedicated to areas higher on the original priority list of the experts (Theisen, 1997). From a political economic viewpoint, the attention to areas hit by a catastrophe is also likely to increase, the more the area is relevant for upcoming elections or re-elections. The closer the results of previous elections were, the likelier it is for politicians that their efforts (e.g. campaigning, allocating additional government funds) turn into an electoral success (Frey, 1978; Mueller, 2003). On top of close election results, it is also presumed that politicians’ efforts are more likely to be rewarded the more critical (pivotal) voters are in an electoral district (Hirschmann, 1964).

Apart from these incentives, politicians exercise power in terms of legislation they can enact over the bureaus’ work. In terms of the participatory (legally prescribed) element in the decision process, politicians might seek some *ex ante* control on the one hand, and on the other some form of increasing the representation of preferences of their voters in the final decision outcome.

3.2.2 Experts (i.e. bureaucrats (agents))

Bureaucrats (i.e. WLV experts) are confronted with two main tasks: on the one hand they have to develop hazard zone maps and on the other they need to install protection measures. The first task is usually the one that is less attractive to agents since it puts themselves in an unpopular situation amongst the public. This often lies in the enforcement of stricter hazard zones (i.e. enlarging hazardous ones) which consequently leads to devaluation of properties and lands. The second task is far more attractive to agents since it provides them with a very powerful position in allocating their budgets towards preventive measures whereby people regard them as a welcome support for their living needs, therefore the acceptance is higher. In order to impede this incentive to overdue the later task, the ministry of the environment has given out the directive that prescribes the development of hazard zone maps before any new preventive measure can be installed. The allocation decision for protection measures needs to be based on a priority setting scheme developed by the WLV. In cases of measures costing more than 1 million Euros, a cost-benefit analysis needs to be conducted (Rudolf-Miklau, 2005). This objectification attempt can nonetheless not always be pursued since political pressure (e.g. after the

avalanche catastrophe in Galtür 1999) forces the WLV to re-allocate budgets towards other areas, where an above-average protection level is consequently achieved.

In terms of participation, detailed behavioural assumptions have been outlined in the models in Sect. 5.2 and will be re-assessed in the operationalisation of the propositions and the empirical study below.

3.2.3 The WLV commission

The hazard zone map has, after its public display, to be approved by a commission which is usually composed of one ministerial delegate, the regional planner as well as the regional head of section and one representative of the municipality for which the plan has been designed (usually this is the mayor). Besides these, sometimes other experts form part of the commission (e.g. the federal geologist in Vorarlberg). The involvement of local governmental representatives is often viewed as problematic by the experts since he will naturally have other criteria (re-election constraint) to consider when giving his vote apart from the mere technical facts. In many incidents that can be found in the protocols, where the commission had to re-discuss the originally developed plans due to objections of affected parties, the mayor is the only person opposing a decision (if the objections can not be sustained). In the view of the bureaucrats this poses big damp to the thorough conduct of their work. Bednarz (WLV, Innsbruck, personal communication, 2005) mentions that in some Austrian federal states also other government experts participate in the commission, e.g. the federal state geologist in Vorarlberg or the forestry responsible in Salzburg or the spatial planner in Tyrol, which poses another impediment to the work of the bureaucrats in his eyes. In effect, this view could be explained in that they have to give away decisive power.

The commission is the one who has to decide collectively on the inclusion of appeals in the re-drafting of the plan and the final decision on it. As explained above, the mayor might have a vested interest in supporting these appeals for his own utility (capture theory). Bureaucrats (i.e. the planner) are however the ones who have a strong influence on the actual integration of appeals received through the participatory process. Their views on whether appeals are legitimate have a strong impact on the draft plan. In a nutshell, bureaucrats' incentives to incorporate these participatory outcomes are the reputation of their positions and possible consequences faced when damages after a natural catastrophe could have been avoided. Furthermore, principals might want to incorporate voters' preferences in order so to enhance their chance to stay in office for the next electoral period.

3.2.4 Voters

Voters finance prevention measures against natural catastrophes through their taxes. The majority of prevention measures is funded by state's funds, whereby also a consider-

able share (usually around 40%) has to be contributed from the municipality directly benefiting from them. As a consequence, the bearers of the costs should be among the ones to have a significant say in terms of where, when and how much should be allocated for this purpose. In effect, this task is delegated to politicians and they again delegate it to their bureaus through constitutional rules. From a theoretical viewpoint, it can be assumed that discrepancy between voters' actual preferences and the tasks carried out by the bureaus can occur. This is even more the case, the more bureaucrats have incentives to follow their own interests and the less affected parties can take part in the decision process. Legally prescribed participation could possibly help narrowing this gap by directly reflecting preferences in specific cases. As already outlined, preferences in the underlying case can be brought in by anyone who can declare a vested interest. In effect, this would entitle every taxpayer to bring in appeals, but in reality, only affected parties make use of this instrument. So the question is what their incentives are to actually participate.

First of all, they want to avoid negative impacts on their utility from hazard zone maps (e.g. devaluation of their properties), hence they might plea for extending hazardous zones expecting future protection measures being installed (thus regaining economic values) or otherwise state against the extension of such zones. All this assumes that people who bring in appeals expect to have some impact on the final decision process or otherwise expect some gain in procedural utility of the decision process.

3.2.5 Interest groups

Besides voters in general, there are several groups of voters that together have a vested interest, besides them as individual tax payers. Among them are for example the tourism industry (e.g. hotel owners, lift operators etc.), environmentalists, the construction industry or farmers. As a group, they might come together to enhance their lobbying power and thus their rent-seeking benefits.

Overall, a high complexity for the decision context is formed by this multiplicity of interests in the final outcome. Theoretically however, from all actors' viewpoints, there seems to be incentives to take participation into their decision accounts.

The factor that could neglect the significance of the integration of public participation is the involved transaction costs, for example stemming from the divergence of preferences of the public and the expert. Hence, the question is: Do experts' judgements actually stand opposite the input lay people can provide in a seemingly high-expertise task?

4 Experts' versus lay people's judgements

Based on constitutional economic assumptions, individual preferences should be represented in the decision process in order to achieve efficient outcomes. Dealing with decisions that are coupled with a high degree of uncertainty (e.g. predictions of natural hazards and protection measures for their prevention), lay people's (or voters', i.e. affected parties) judgement is often deemed to be subject to anomalies (Kahnemann et al., 1982; Nisbett and Ross, 1980, or Eichenberger, 1992), where the assumptions of a rational choice individual do not hold anymore (rather than that they are dependent on the institutional framework, the scope for perception and the amount of information they can gather; van Aaken, 2006). Especially for small probabilities of uncertain events and the risk of loss, the individual choice poses problems since such events and risks are systematically being neglected (Eichenberger, 1992). Arising anomalies in the choice behaviour of individuals could lead to a cut in decision freedom through paternalistic legal norms, since it is believed that anomalies could impose costs to individuals as well as the collective (van Aaken, 2006). Such paternalistic decision-making could imply shifting the decision to objective expert judgement without the individual preferences taken into account (whereby the process efficiency criterion could be left unfulfilled). However, many studies have shown that voters' information basis, especially concerning topics that affect them immediately (like e.g. natural hazards in their own municipalities), has been underestimated (e.g. Wittmann, 1989). On the contrary, it can be argued, that experts, against the wide believe that they can give a more objective view for such decision structures, equally face anomalies in their judgements (Eichenberger, 1992). Assuming that these anomalies among individuals exist there are two possible ways for resolution: Installing a paternalistic decision rule is acceptable for situations where affected parties themselves decide on such a decision rule, thus assuming their own anomalies leading to disadvantageous outcomes (Eichenberger, 1992). Van Aaken (2006) suggests keeping up integrating individual preferences in a direct way via a communication process (with the affected parties) that could reduce their anomalies and consequently could lead to rational choices. The present study's legal prescription of alternative participatory elements can therefore be interpreted in the light of this proposition, whereby the two sides of the communication channel (expert bureaucrats and affected parties) could decrease their choice anomalies by engaging in an exchanging communication process.

5 Conclusions

The initial proposition of the present paper was that public participation in high expertise decisions that involve a considerable degree of uncertainty could be beneficial; both for

experts, to gain in acceptance and divide the share of responsibility for the consequences of unforeseen events, and the public, for integrating their local knowledge about natural hazards as well as preferences in the decision process. The barriers to such a decision process in practice were shown to be manifold: bureaucrats have no legal incentive to incorporate such an element and lay people might be reluctant to participate expecting their contribution to be unheard. It has been shown that the argument that lay people face anomalies in their decision judgement is also applicable to experts and furthermore can be reduced through a thorough information process ahead of the decision. A rigid analysis of the interests involved in such a decision process, as in the hazard zone planning case shown in this article, can provide the necessary knowledge for setting the legal decision framework for successful incorporation of such participative elements. The enforcement of the decision in a paternalistic manner through expert decision responsibility can be however acceptable as long as affected parties agree upon such a decision rule.

The theoretical foundations allow us to conclude that public participation can indeed offer a ground to more efficient decisions in uncertain contexts such as the management of natural hazards is. However following this; it will be necessary in future studies to test this proposition empirically to see first of all whether such participative elements are adopted by the public and if so, if it is only decorative to final decision makers (i.e. experts) or actually taken seriously into their decision considerations. This allows providing the necessary framework for installing such decision mechanisms legally to reinforce the democratic instruments already in place.

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