

# The effectiveness of environmental precautions within zoning planning in Germany

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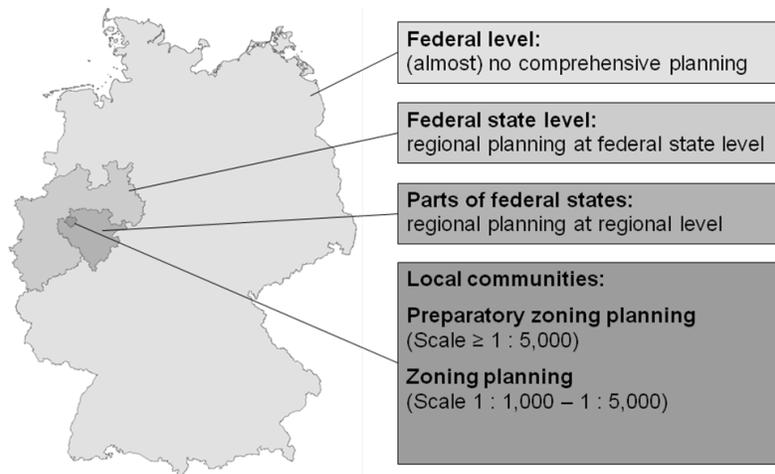
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## 1. Introduction

Driven by an ongoing change of mind in society, environmental protection has become significantly more important over time. Early sector-oriented environmental protection had to defeat technical risks such as immissions or nuisances to ensure human health. Later development has led to an understanding of environmental protection meaning nature conservation, reduction of resource consumption and finally as a big metaphor 'sustainability'. Since that discussion is present over decades and global scale environmental impacts such as climate change are widely recognised, environmental protection has become an established societal challenge. As a consequence, conservation and protection of environmental resources has become a constitutionally codified task (in Germany in 1994) with impacts generally for public law and especially for planning law. The German planning system comprises up to five<sup>1</sup> hierarchically ordered levels that range from the federal level<sup>2</sup>, the federal state level, the regional level down to the local level that also can be divided into a preparatory and a legally binding planning level. Besides this scheme reflecting comprehensive planning, there is sectoral planning (concerning e.g. roads, energy infrastructure or nature conservation) that is settled at one or more of the above levels indeed, but acts formally independent and parallel to comprehensive planning. At the local level a high density of planning assignments are made by (usually only one) preparatory zoning plan (Flächennutzungsplan) and a multitude of 'ordinary' zoning plans<sup>3</sup> (Bebauungsplan). They can be distinguished by their spatial coverage, their degree of compulsion and their content. The preparatory zoning plan usually covers the total community area and is compulsory for public bodies and administrations only, whereas zoning plans cover only parts of the community area but have to be considered by everybody.



*Fig. 1: Levels of spatial planning in Germany*

<sup>1</sup> The number of planning levels depends on the federal state, because some of them don't have a regional level and others are city states.

<sup>2</sup> It has to be amended, that planning at the federal level presently only concerns areas in the North Sea, the Baltic Sea and additionally some technical infrastructures.

<sup>3</sup> German-English translations differ - the zoning plan is also called land use plan respectively binding / legally binding land use plan.

While preparatory zoning plans make only basic land use assignments (e.g. housing, industry or green space), zoning plans are intended to define allowances and restrictions of the use of certain lots, the settings and characteristics of buildings or distribution of natural elements within urban areas.

For several reasons zoning planning has an important meaning for environmental protection. On the one hand, basic legal prerequisites are created by zoning planning in a way allowing for more or less environmentally invasive use of lots. The predisposition of functions as housing, production or transportation implies planning's extraordinary accountability - since spatial structures appear to be very persistent over time. On the other hand, environmental release and precautions are an important task delegated to zoning planning in terms of soil protection, impact mitigation or environmental impact assessments. Since zoning planning has to integrate both, very different and often contradictory spatial needs at different scales and levels, this 'bottom-layer' is the closest one to physical change and developments in urban environment. This becomes clear considering that the content of many planning assignments and policy claims (e.g. traffic reduction, noise abatement or brownfield recycling) finally have to be concretised and operationalised at the local level.

## **2. Theoretical prerequisites concerning environmental precautions**

Since environmental precautions are intended to "contribute to a high level of protection of the environment" (DIRECTIVE 2001/42/EC, N° 6) they're implemented into planning law. Zoning planning in Germany is legally based on the Federal Building Code (BAUGESETZBUCH; BAUGB) that claims zoning plans shall ensure a sustainable development that balances social, economic and environmental requirements. Furthermore, they're generally intended to protect and develop natural livelihoods and to protect a humane environment (§ 1 V BAUGB). When a zoning plan is set up, there're additional requirements that have to be considered:

1. impacts on humans, animals and vegetation (flora & fauna), soil, water, air, the climate, the interactions between them, landscape scenery and biodiversity
2. preservation aims and the purpose of protection for Natura 2000 areas (protection of species and their habitats with a European perspective)
3. environmental impacts on humans including their health and the population at all
4. environmental impacts on cultural goods and assets
5. avoidance of emissions and appropriate treatment of waste and wastewater
6. the use of renewable energy and the efficient use of energy
7. landscape plans and other plans, especially those concerning water, waste and pollution
8. the protection against air pollution
9. interactions between the numbers 1, 3 and 4 (§ 1 VI Nr. 7 BAUGB)
10. protection against flooding (§ 1 VI Nr. 12 BAUGB)
11. soil protection: reduction of sealing, re-use of brownfields, reduction of conversion of areas presently used for agriculture, forestry or housing (§ 1a II BAUGB)
12. avoidance, mitigation and compensation of impacts on nature and landscape scenery (§ 1a III BAUGB)
13. results of an impact assessment according to Flora-Fauna-Habitat-Directive (§ 1a IV BAUGB).

The above concerns are those directly related to environmental issues. Of course, there're some more economical and social concerns that have to be taken into account. Balancing of different and contradictory concerns is managed by weighing (and ranking) of different interests and concerns (§ 1 VII BAUGB). Accordingly, in a certain planning situation some of them will be treated to be more important than others (e.g. additional commercial usage might appear to be more important than open-space protection - despite a high degree of sealing), depending on decisions made by the municipality council and the planning administration.

Since the above requirements mostly are legal terms that need to be interpreted depending to the particular case, there're different sources of information to be used (see STÜER 2009, p. 441-442). Legal regulations<sup>4</sup> set minimum standards to prevent environmental impairments. These standards may be critical values (e.g. on noise

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<sup>4</sup> laws and ordinances that are different from Federal Building Code

or air pollution), established recommendations (e.g. technical standards) or normative instructions (e.g. protection of certain species). Furthermore, there're (binding) statements of both, other comprehensive and sectoral plans. For example, landscape plans usually contain a complex inventory of present landscape functions and natural goods as well as proposed developments, e.g. renaturation of degraded areas. Finally, specific expert opinions can give estimates to be used e.g. for environmental impact assessment or for the application of the impact mitigation regulation. Since the meaning of requirements in a certain setting is due to (planners') interpretation and therefore flexible, the effectiveness of environmental precautions within zoning planning most likely differs. Though this conclusion seems to be almost trivial, it does lead to important questions indeed. These questions shown below are subject to ongoing research:

- How has the 'effectiveness of environmental precautions' to be defined?
- How can the effectiveness of environmental precautions be measured?
- Does the effectiveness of environmental precautions (really) differ among zoning plans?
- What factors influence decisions with respect to the effectiveness of environmental precautions made within zoning planning?

When discussing the term 'effectiveness' it has to be clarified that understandings may considerably differ. As NEWIG & FRITSCH (2009) point out, a distinction between outputs and outcomes has to be made. Though that research is related to the effectiveness of environmental governance, conclusions are obviously transferable to zoning planning as well (see p. 217). According to KOONTZ & THOMAS (2006) it can be outlined that "Outputs are the plans, projects, and other tangible items generated by collaborative efforts. Outcomes are the effects of outputs on environmental and social conditions" (p. 113).

The effectiveness of environmental precautions has to be understood and measured as the output of zoning planning. Since the output is a binding public 'plan' incorporating a normative character indeed, it has a meaning as guiding objective(s) for local spatial development. Because of this, it has to be expected that both enhancements and impairments of environmental conditions (outcomes) are depending on planning outputs made in advance, what implies that these should be concerned primarily within research<sup>5</sup>. The scheme below shows the basic concept of the distinct understandings of effectiveness within this research.

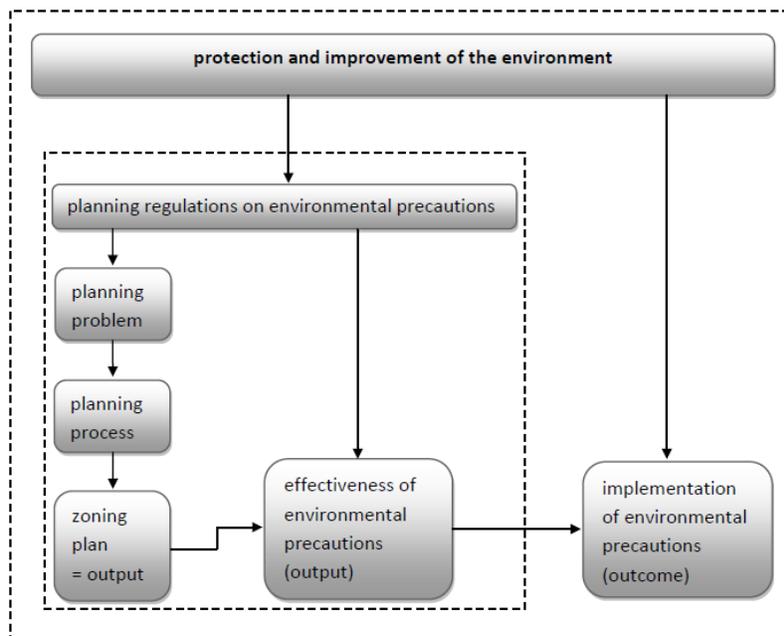


Fig. 2: Different types of effectiveness

<sup>5</sup> It's unlikely to achieve the implementation of environmentally effective measures if the plans lack effective environmental precautions.

Though unfortunately little research on the effectiveness of environmental precautions within local planning in Germany has been conducted yet, present evidence suggests that the effectiveness of environmental precautions within zoning planning may rather be poor respectively very unequally among a multitude of planning procedures. GRUEHN (1998) evaluated a large sample of preparatory zoning plans distributed over the total area of Germany. One focus of the work was to investigate whether requirements of nature protection and landscape conservation are integrated properly with preparatory zoning planning. As an important finding, 15 % of the municipalities considered the requirements of nature protection and landscape conservation at least partially within their preparatory zoning plans, whereas 85 % didn't integrate them at all (see p. 362). Another work<sup>6</sup> by GRUEHN & KENNEWEG (2001) shows, that the effectiveness of requirements of nature protection and landscape conservation within zoning plans is highly depending on the availability of specific information<sup>7</sup> (see p. 102). Some other work tries to answer very specific questions with an accordingly rather narrow perspective. PRÖBSTL, SCHÖLZKE & SCHNEIDER (2007) evaluated zoning plans regarding the application of the impact mitigation regulation<sup>8</sup>. They found that about 30 % of the respective zoning plans failed to define avoidance measures to all the subjects of protection<sup>9</sup> as they should (see p. 140). With regard to compensation measures, SPERLE (2010) argues that within a small set (N = 20) of zoning plans 70 % of them are missing acceptable compensation measures at all (see p. 10). To understand zoning planning outputs, it's necessary to bring the procedure to mind.

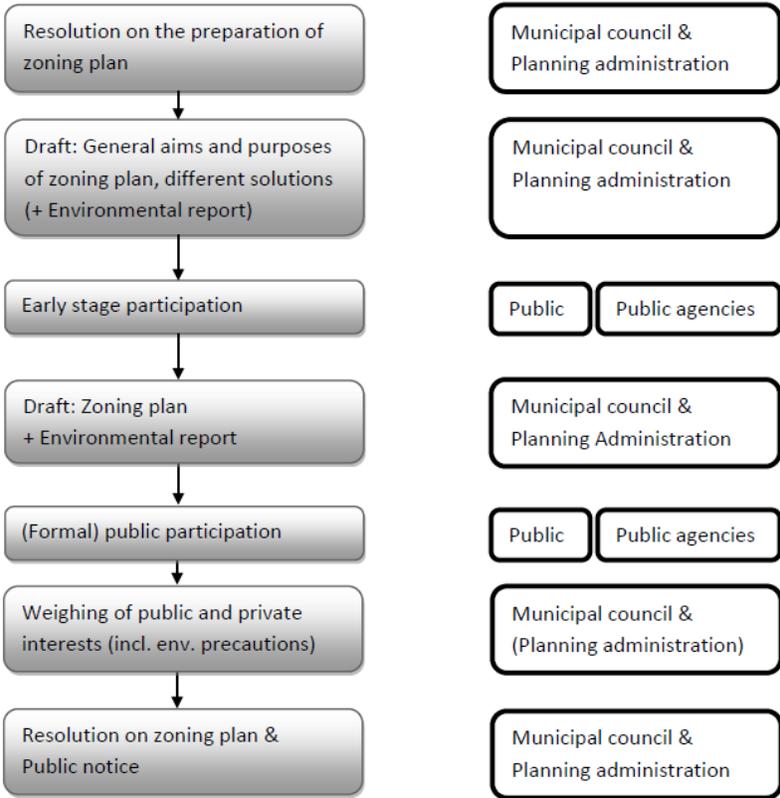


Fig. 3: Zoning planning procedure in Germany

According to the Federal Building Code, this scheme (figure 3) shows the steps to develop a zoning plan. The column on the right outlines the main stakeholders, comprising the municipal council (that commissions and

<sup>6</sup> comprising a sample of N = 33 within the federal state of Rhineland-Palatinate  
<sup>7</sup> expert opinions on nature protection and landscape conservation  
<sup>8</sup> The impact mitigation regulation commits planners to primarily avoid, to mitigate and to compensate impacts on the nature and the landscape scenery (§ 1a III BAUGB).  
<sup>9</sup> what is mandatory

authorises the administration to prepare zoning plans) on the one hand and the public respectively a multitude of public agencies<sup>10</sup> on the other.

Basically, there're three crucial elements within the procedure: the draft of the zoning plan, the participation process and the weighing. Both, the draft and the participation inputs are sources of information that sketch the planning problem as well as environmental and technical frame conditions. Furthermore, they allow for anticipation of plannings' social acceptance<sup>11</sup> in terms of conflicts related to property rights, environmental issues or distributive justice. If information can be understood as input, therefore a planning decision by weighing equates the output.

This rationale is of significant importance to understand the discussion about the effectiveness of environmental precautions. As mentioned above, outputs of zoning planning obviously aren't as effective as they should be in terms of the requirements formulated by the Federal Building Code. Based on a comprehensive analysis, GRUEHN (1998) gives a simple but considerable empirically based explanation, that the (preparatory zoning) planning output can only be influenced by those concerns related to nature protection and landscape conservation, that were perceived in the planning process before (see p. 363).

### 3. Research approach

Since a zoning plan that totally complies with the requirements on environmental precautions as claimed by the Federal Building Code would be most effective, this concept has to be approached by defining the respective precautionary requirements<sup>12</sup>. Depending on the model of zoning planning procedures, a set of appropriate variables has to be identified. As assumed, the planning output and for this reason the effectiveness of environmental precautions depends on three primary factors<sup>13</sup>. According to the legally specified procedure, these are:

I. Precautionary requirements, comprising (non-exhaustive):

- requirements set by Federal Building Code,
- further legal and professional requirements and

II. Information input by the zoning plan, comprising (non-exhaustive):

- explanatory report and environmental report,
- expert opinions and
- planners' perception and interpretation of precautionary requirements (I).

III. Information input given within the participation procedure, comprising (non-exhaustive):

- suggestions and concerns of public agencies and
- suggestions and concerns of the public.

Due to theoretical prerequisites, the interaction of these primary factors determines both, the planning output itself<sup>14</sup> and its effectiveness in relation to environmental precautions. Based on the research questions and the model of influencing factors, hypotheses have to be derived and operationalised that make use of designations used in zoning plans. Since some more theoretical preliminary is required at this early step of the research process, the final characteristics and layout of the quantitative research design haven't been determined yet. The diagram below clarifies the research concept as described before and the development of the research process at a glance.

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<sup>10</sup> e.g. public utility infrastructure, environmental and conservation organisations, neighbouring municipalities

<sup>11</sup> An overview is given by: NEWIG/FRITSCH (2009), p. 209-213

<sup>12</sup> refer to the above enumeration

<sup>13</sup> These primary factors should be understood as subsumption of a set of variables yet to define.

<sup>14</sup> the shape and the features of the zoning plan

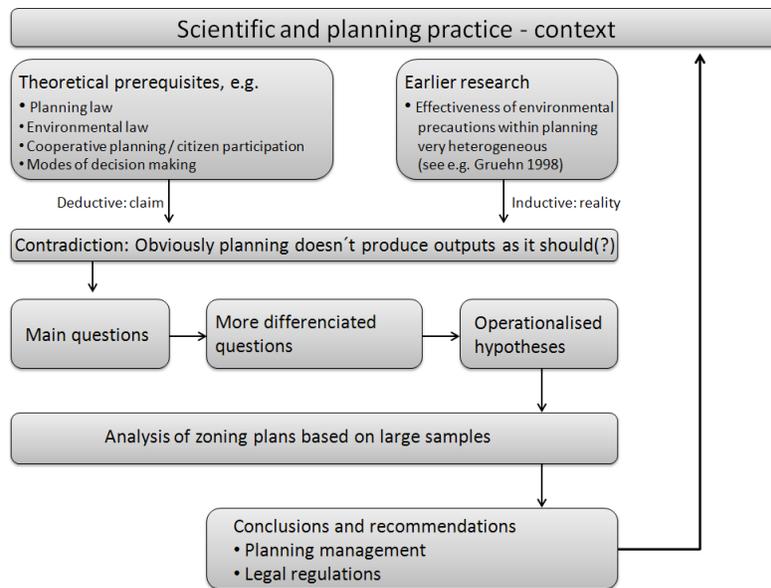


Fig. 4: Research concept

#### 4. Selected findings concerning zoning planning in Dortmund (Germany)

To gain first insights into information availability and with regard to later statistical sampling, an initial analysis of planning procedures has been finished. Since planning documentation is easily available and an appropriate sample size was expected, Dortmund has been chosen as spatial reference. This municipality is located in the federal state of North Rhine-Westphalia and comprises an area of about 280 km<sup>2</sup> with a population of about 590,000. Data collection is based on the documentation by the municipal council of Dortmund and includes the zoning plans, their explanatory report and possible environmental reports. The analysis is restricted to the period 2007 to 2011 but comprises all 81 zoning planning procedures that were completed within this period.

According to Federal Building Code, there're regulations concerning designations (output)<sup>15</sup> of a zoning plan and the possibility not to include an environmental report (information input)<sup>16</sup> in certain cases (§§ 12, 13, 13a BAUGB). Since there're considerable procedural differences among these procedures and the 'usual' ones, knowledge about the shares of the each type of planning procedure is of importance with regard to the research design. Accordingly, analysis focused on the following questions

- What is the number of zoning planning procedures completed within particular periods?
- What is the share of zoning plans according to § 12 or to §§ 13, 13a BAUGB?
- What is the average area of zoning plans?
- What distribution of zoning plans related to different land use can be observed?
- To what extent do public agencies and the public in general raise (environmental) concerns against the zoning plans?
- What are the environmentally related concerns about?

<sup>15</sup> Zoning plans, led by a specific investor.

<sup>16</sup> Zoning plans, with an extent of use for built-up areas smaller than 20,000 respectively 70,000 m<sup>2</sup> or those containing modifications, additions or cancellations of existing zoning plans.

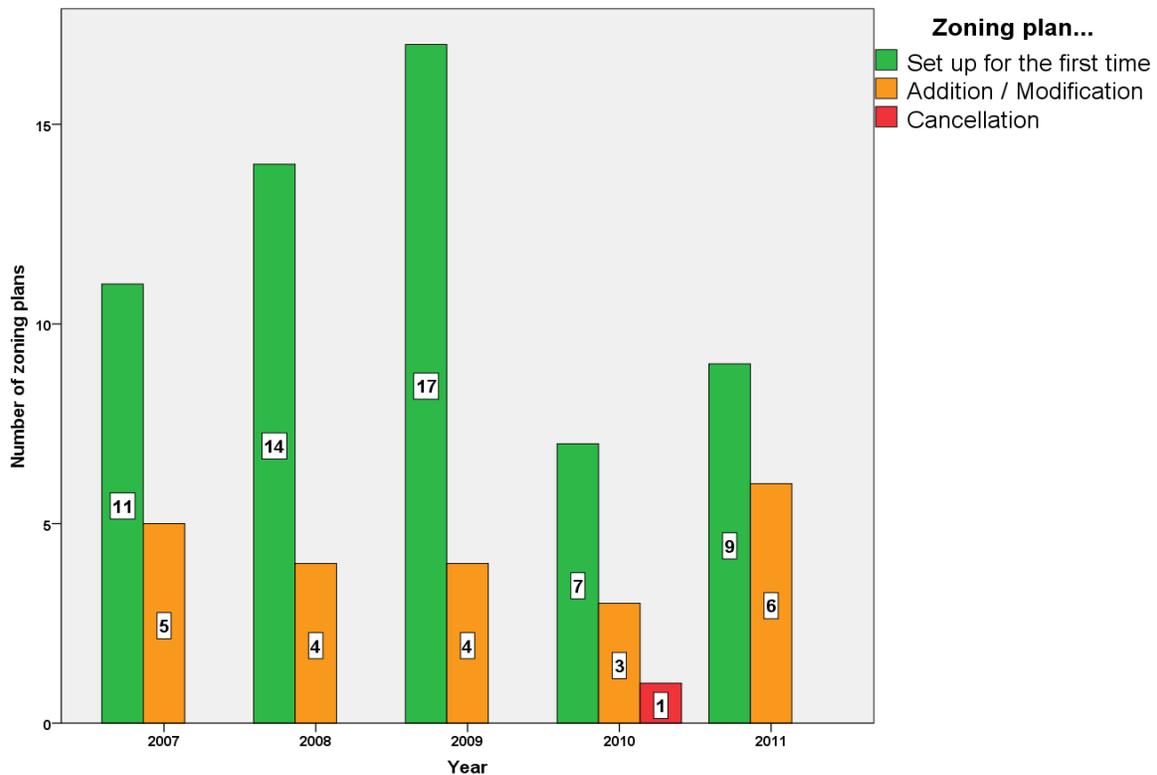


Fig. 5: Number of zoning planning procedures

As shown above, the annual number of zoning plans that were set up respectively subject to modifications or cancellation ranges from 6 to 21. Whereas only one cancellation of a zoning plan can be observed, there's an unexpectedly high number of zoning plans that were modified. Since 58 zoning plans were set up for the first time, this group remains the most important one in terms of quantity.

Concerning the proportion of 'usual' and of investor-led zoning plans according to § 12 BAUGB has to be noticed that those can clearly be identified as minority (16 of 81). Even with a more narrow perspective excluding those zoning plans that were modified or cancelled, the proportion of investor-led zoning plans remains only 16 of 59.

The proportion of 49 of 81 procedures that don't provide an environmental report is a considerable finding, meaning that only about 40 % of zoning plans were subject to a strategic environmental assessment (SEA). In relation to only those zoning plans that were set up for the first time (30 of 59), a percentage of 50,8 % suggests that the environmental report isn't an inherent part of zoning plans in Dortmund (anymore).

Concerning the average area covered by zoning plans has to be amended, that this information wasn't available in eleven cases. Therefore, the respective analysis reflects a sub-sample only. The average area covered by zoning plans ranges from 270 m<sup>2</sup> to 736,000 m<sup>2</sup> with a mean value of 55,152 m<sup>2</sup> and a standard deviation of 118,436 m<sup>2</sup>. With a total area that sums up to 3,860,000 m<sup>2</sup>; approximately 1,4 % of Dortmund's area was subject to zoning planning within the reported period between 1998 (earliest resolution on the preparation of a zoning plan) and 2011.

The analysis with regard to different land uses is restricted to those zoning plans, that are set up for the first time or that contain modifications of earlier zoning plans. The total number sums up to 80. Though it was to estimate that the most frequent zoning plans would be those for housing respectively commercial or industrial uses, the clear distinction shown with the diagram below is surprising especially with regard to a share of commercial and industrial use that is equal to housing.

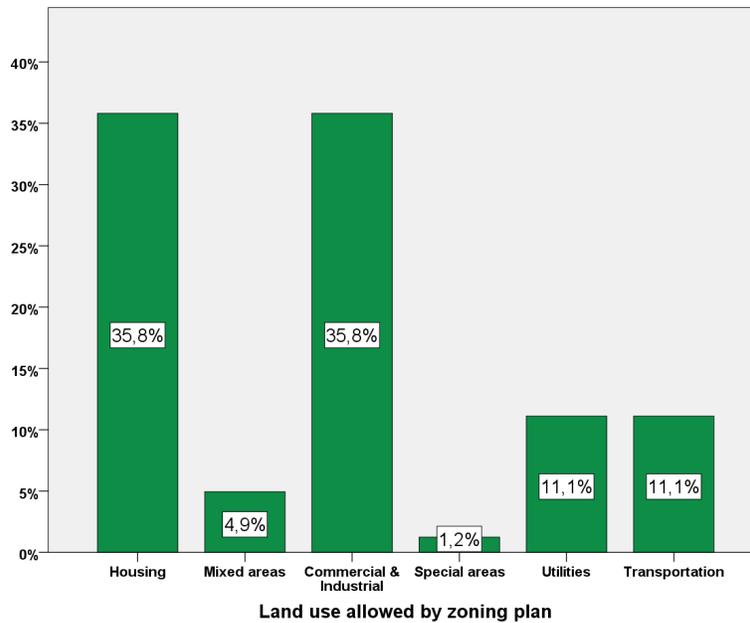


Fig. 6: Shares of zoning planning procedures by land uses

However, the average area covered widely differs among zoning plans dedicated to different land uses. Due to urban development projects<sup>17</sup> - usually designated as mixed areas or special areas within zoning plans - extraordinary high mean values can be explained by the spatial extent of these projects.

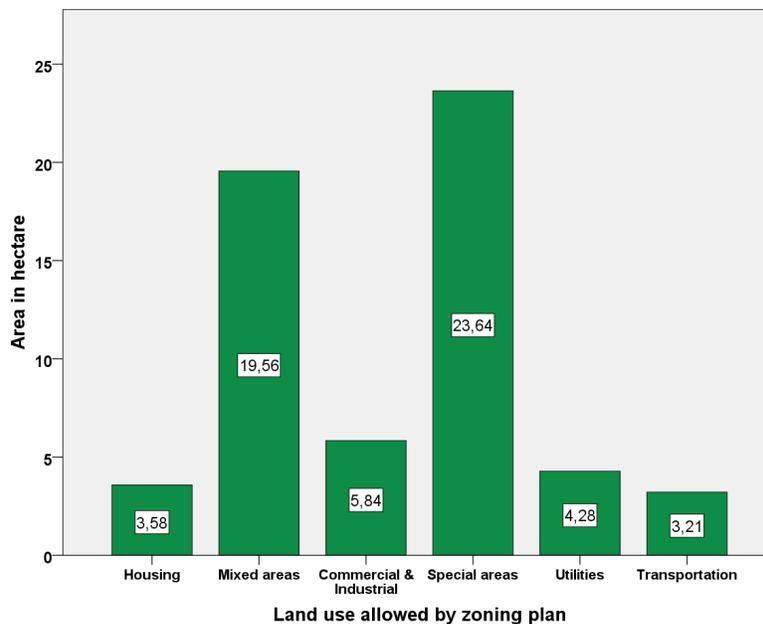
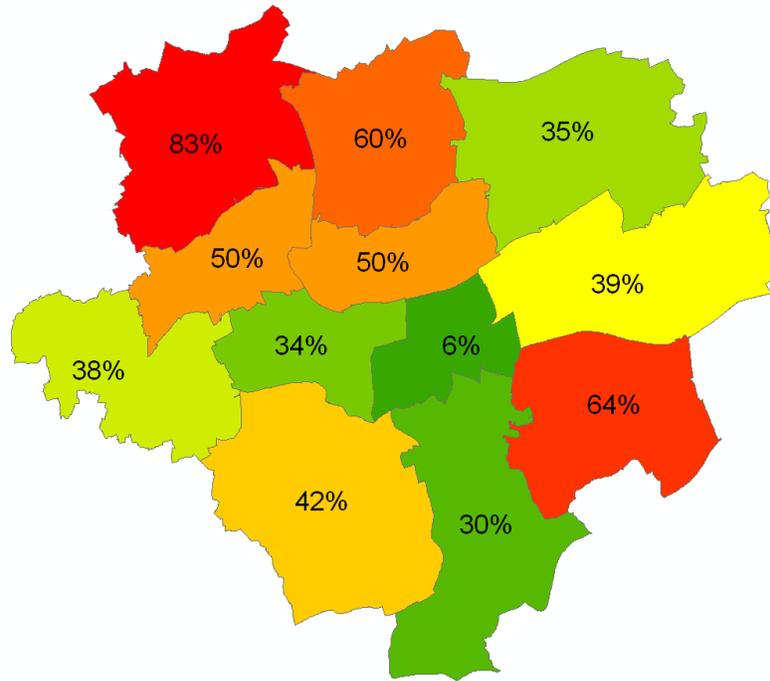


Fig. 7: Average area of zoning plans by land uses

To clarify the extent to what the public and public agencies raise concerns against zoning plans, critical inputs by these groups have to be identified. Since different persons often express identical concerns, only those with different content were included in the analysis. The number of different environmentally related concerns ranges from 0 to 14, while the highest number of all concerns is 20. Overall, 119 of 305 concerns are related to

<sup>17</sup> conversion of former military or industrial sites

environmental issues of the zoning plans (39,0 %). Though this figure seems to be quite low, it has to be amended that most environmental concerns within participation procedures are expressed by a multitude of citizens and therefore the above percentage purposely is an underestimation.



*Fig. 8: Share of environmentally related concerns among Dortmund administrative districts*

Besides that, there's a wide variety of the proportion between environmentally related concerns and the total number of concerns on the level of Dortmund's administrative districts as shown above. Actually, this distribution lacks an explanation but will be subject to future research indeed.

On average 1,47 environmentally related concerns were raised within each zoning planning procedure. Though this number appears to be quite low, it has to be taken into account that it represents only those concerns that were different from another. However, the average number of all concerns that were raised reads 3,77 per procedure. Despite this seemingly low number of concerns about environmental issues, only 17 of 81 zoning planning procedures achieved to consider and integrate at least one of the concerns (21,0 %). Furthermore, a total of 31 environmentally related concerns have been considered and integrated into planning output (26,1 %).

Regarding in particular the procedural feature of zoning plans to either incorporate a SEA or not supports a considerable assumption about the function of specific and transparent environmentally related information. Since the average number of environmentally related concerns is significantly ( $p \leq 0.001^{***}$ )<sup>18</sup> higher if the zoning plan provides an environmental report, this can be interpreted as an effect of additional environmental information presented to citizens and public agencies that might ease respectively influence citizen involvement.

<sup>18</sup> Kruskal-Wallis H-test on rank differences

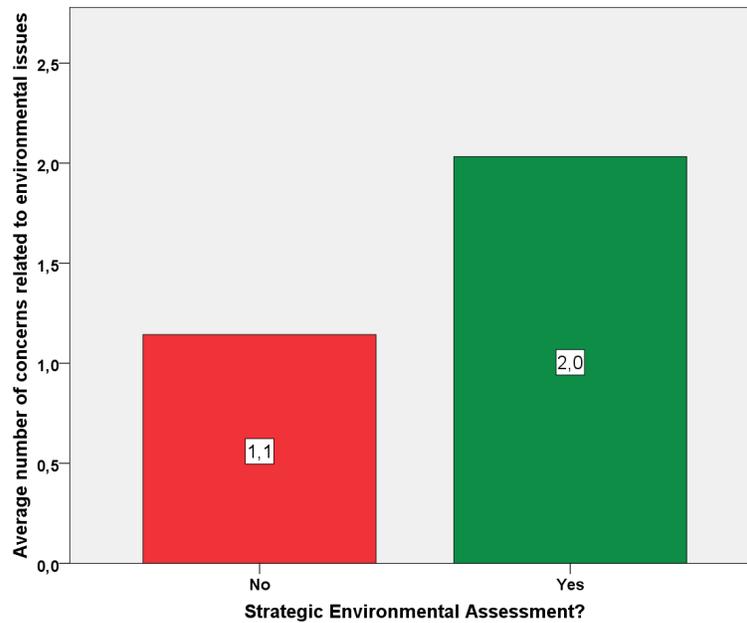


Fig. 9: Different average numbers of concerns related to environmental issues

Finally, it's of interest what the environmentally related concerns were about. As tabulated below, the most frequent environmental factors that citizens and public agencies referred to are both, the 'lively' ones and the least abstract ones. Whereas the term and the concept behind biodiversity, climate or interactions might appear rather vague to 'ordinary' citizens and intangible even to planning professionals, probably everybody has an understanding for urban green, animals, the accustomed landscape scenery and of course the own health. Therefore the willingness and the ability to raise concerns regarding those environmental factors within zoning planning procedures might be higher. The statistic counts to what environmental factors the concerns belong. Since several different concerns often belong to only one environmental factor, the total number of counts is far lower than the total number of environmentally related concerns.

Environmental factor	Number	%
Flora & Fauna	30	37,5
Humans & Human health	22	27,5
Landscape scenery	8	10,0
Soil	7	8,8
Water	7	8,8
Climate	5	6,3
Air	1	1,3
Biodiversity	0	0,0
Material assets & Cultural heritage	0	0,0
Interactions	0	0,0

Tab. 1: Distribution of environmentally related concerns in relation to environmental factors

## 5. Summary & Conclusions

First of all it's important to keep in mind that conclusions based on the material presented with this paper are spatially limited to the city of Dortmund and therefore don't allow for generalisation. Therefore, the findings and especially conclusions as stated below should rather be understood as preliminary hypotheses that need further statistical confirmation yet.

Zoning plans that are set up for the first time seem to be most important in terms of frequency. Among different years, considerable variations concerning the number of planning procedures can be observed. The most important types of land use are housing and commercial respectively industrial. Both summed up were subject to more than 70 % of the zoning plans. Since environmental issues often are affiliated to particular types of land use, this distribution likely implicates (at least concerning Dortmund) a need to focus and to adjust research with certain respect to issues related to rather extensive areas as sealing, conversion of valuable open space or physical and aesthetical degradation of urban natural environments. The average size of areas covered by different types of zoning plans has to be compared against samples of especially smaller municipalities. If connections among quantitative characteristics (e.g. population, total area, building activity) could be identified, an estimator of the sample size that has to be achieved (related to each municipality) could be derived<sup>19</sup>.

Regardless of what land use they allow for, zoning plans led by the municipality still are the most frequent procedure. Concerning the information input by the public and public agencies can be concluded, that a sufficient number of environmentally related concerns may be expected. On average more than one of these concerns were raised in Dortmund what can be interpreted at the one hand that participatory instruments within zoning planning are used by citizens and public agencies to improve planning outputs and on the other that especially environmental issues in zoning planning are of scientific importance and should be discussed by planning research.

The proportions of planning procedures according to §§ 13, 13a BAUGB that don't provide a SEA lead to the considerable conclusion that planning information by environmental reports can't be taken for granted and therefore, the (yet to define) final research design should match different types and extents of planning documentation.

Nevertheless, it's surprising to recognise that this instrumental 'incentive' became more important than the 'regular' procedure in terms of quantity. When the SEA was introduced into the Federal Building Code in 2004, every new zoning plan was meant to be assessed. Though the European Union DIRECTIVE 2001/42/EC didn't claim to apply the SEA-procedure to every plan, the local bodies' interest organisation(s) and the federal parliament preferred to decide this way. The main argument was that decisions from case to case to conduct a SEA would lead to administrative uncertainty. However, this regulation was modified by the end of 2006 with respect to stimulate the duration of planning procedures and to increase the number of planning procedures that allow for re-using brownfields and inner-city areas. Those zoning plans that permit less than 20,000 m<sup>2</sup> built-up area 'got rid' of the obligation to incorporate a SEA whereas zoning plans up to 70,000 m<sup>2</sup> became subject to a particular pre-assessment on the necessity of a SEA. As shown by comparing SEA- and non-SEA procedures, significantly different average numbers of environmentally related concerns could be observed. Referring to a rationale that links the availability of transparent environmental information through environmental reports to an increasing ability to participate and to raise concerns, attempts to further 'improve' (zoning) planning regulations by reducing procedural and / or environmental requirements should be discussed carefully. Both effective and transparent environmental precautions and citizen involvement are interdependent and of course are intended by the Federal Building Code. Accordingly, claims to relativise the role and position of either SEA or citizen involvement should be aware that the effectiveness of environmental precautions within zoning planning isn't given anyway.

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<sup>19</sup> based on the published statistics on land use

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