

Assessment of Sustainable Land Use within the Town Planning Process Experiences with a Multi Criteria Approach (MCA)

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1

Objectives

- Motivation: increasing land consumption and on going urban sprawl
- Multi criteria Assessment (MCA) scheme for sustainable land use
 - Ecological criteria and indicators
 - Social criteria and indicators
 - Economical criteria and indicators
- Application of MCA within the preparatory land use planning process
- Conclusions

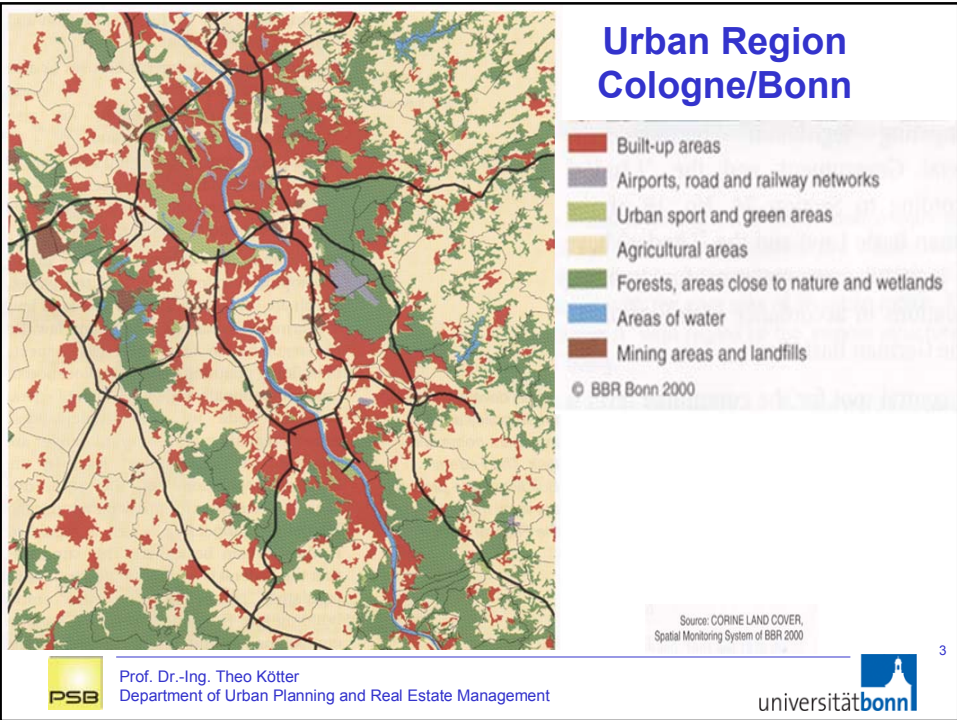


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2

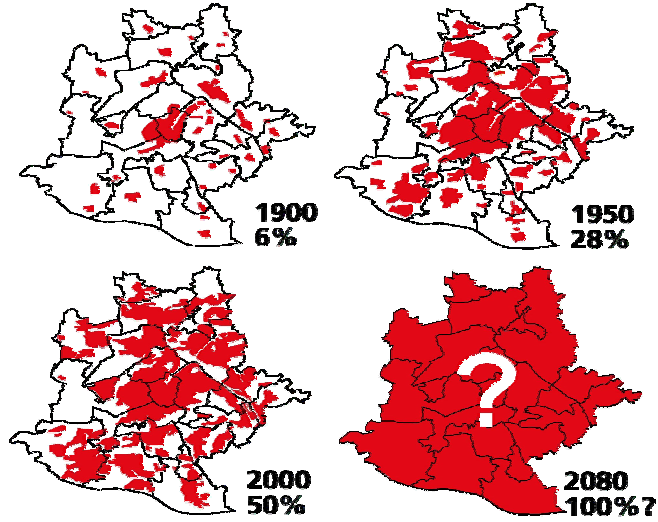


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A Vision for agglomerations in the year 2080? Region of Stuttgart, Germany

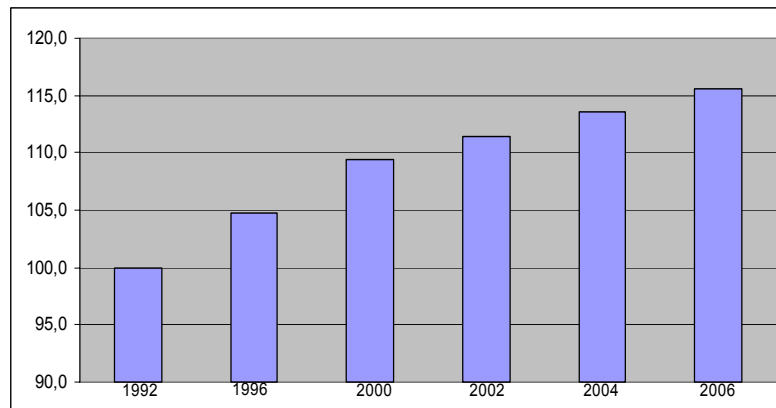


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5

Increase of settlement areas in Germany



1992 = 100 %

2006 = 106 ha/d



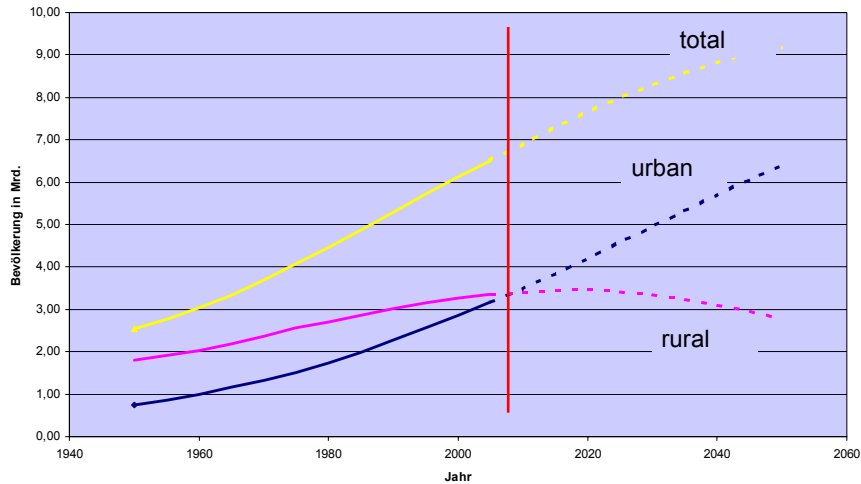
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6

The world becomes urban

Development of population



since 2007 more people live in urban than in rural areas



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7

Definition „Sustainable Development“

„Sustainable development is environmental protection, social equity and economic growth“

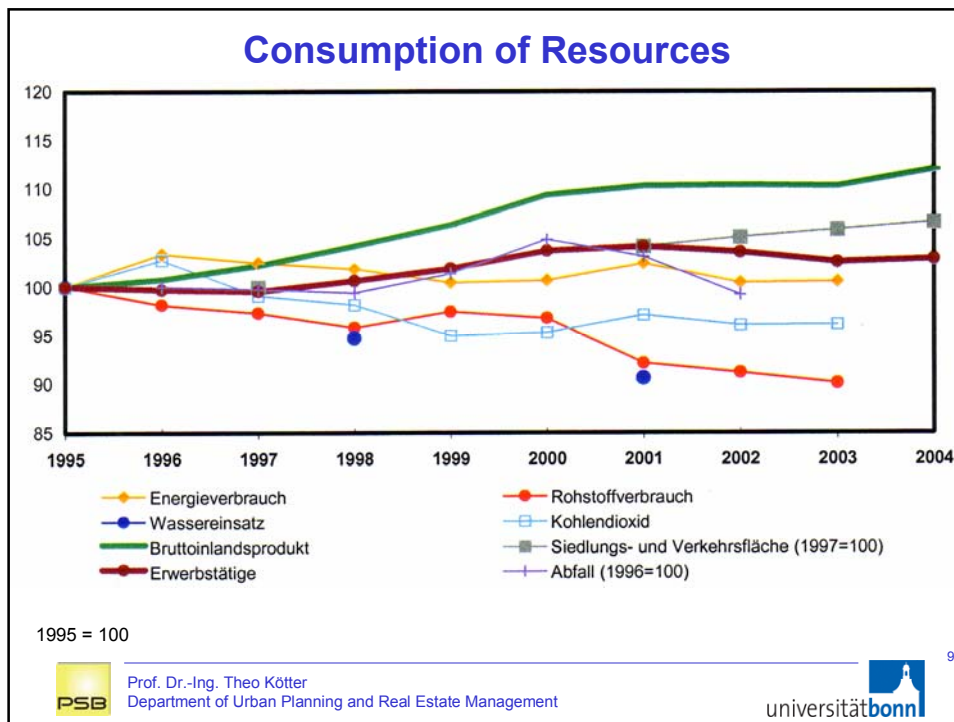
World Business Council for Sustainable Development



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8



- ### Fields of Sustainable Urban Development
- Efficient land use
 - Precautionary environmental protection
 - Socially responsible housing
 - Urban mobility management
 - Local economic development
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Efficient Land Use

- Reduction of the increase of settlement and transport areas
- Reuse of urban wasteland and vacant buildings
- Optimal urban building density
- Preservation and connection of climate-effective undeveloped area
- Reduction of soil sealing



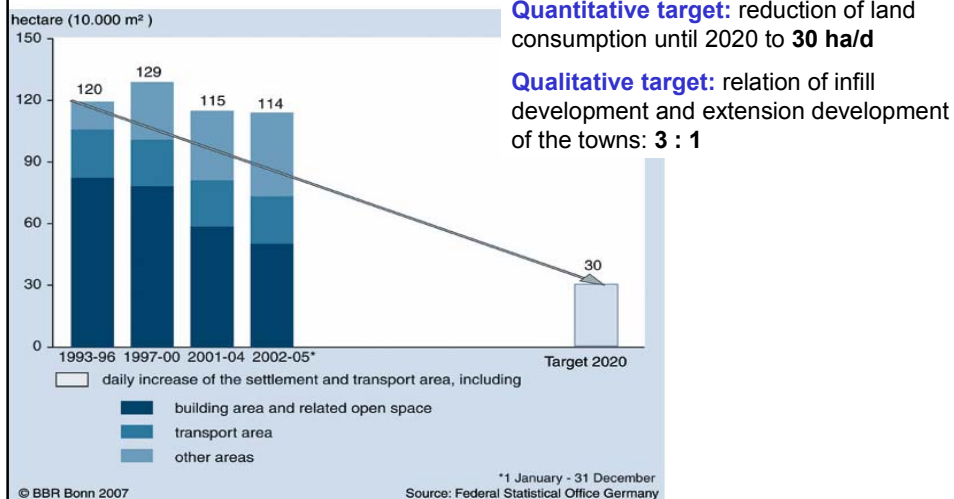
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11

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Targets of Sustainable Land Use



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12

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Research programme REFINA

- Research for the reduction of land consumption for settlement and traffic purposes and for the limit of urban sprawl
- Targets:
 - Provision of a **scientifically reliable basis** for planning decisions and measures, which define the land use.
 - Support of the development and testing of **innovative strategies and land policy concepts** for a sustainable land use and land management



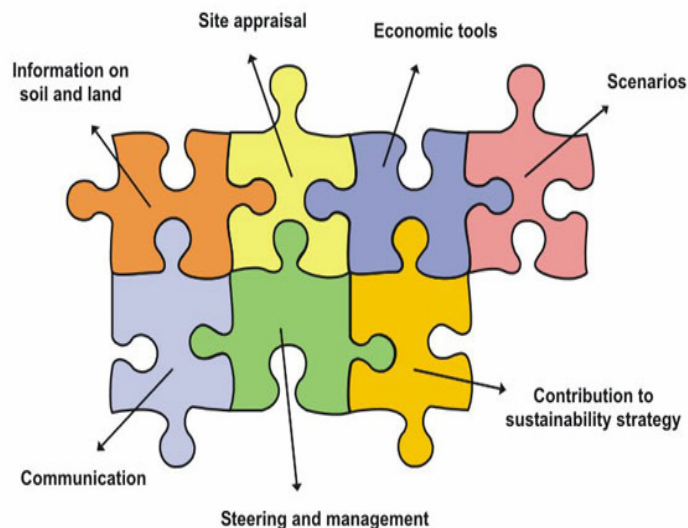
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13

REFINA Topics



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14

The Project FIN.30 (Intelligent Use Land)

1. Planning tool:

Multi criteria assessment (MCA) tool for sustainable land use and land management

2. Land policy tool:

Revolving fund to support infill development

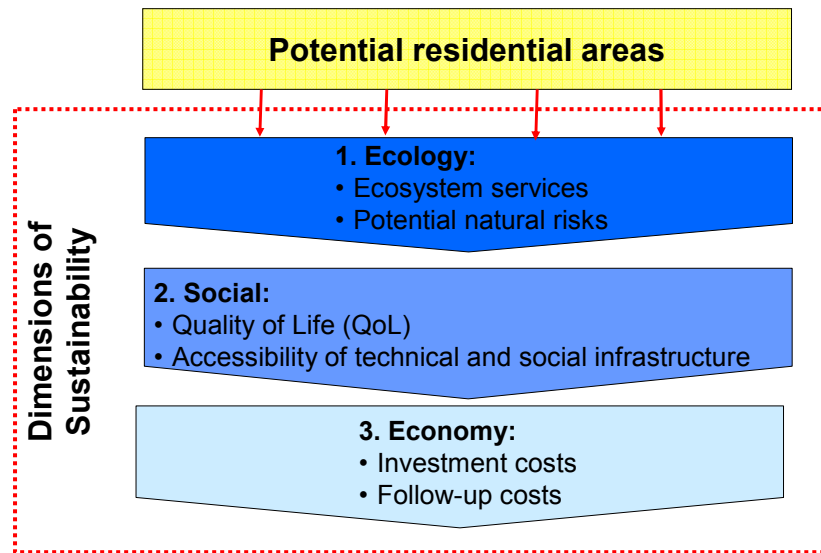


Functions of a MCA

- 1. Analysis function:** Deduction and operationalisation of complex system - interrelationships to provide a broad understanding of sustainability.
- 2. Reduction and information function:** Reduction of complexity to depict reality by a model that allows its communicability.
- 3. Decision-making support:** Appropriate indicators provide a rational basis and transparency for the planning process and especially for the decision-making process.
- 4. Controlling function:** Different planning scenarios can be evaluated based on the assessment framework using MCA to ensure a sustainable urban development.
- 5. Monitoring function:** A continuous target - performance comparison allows a monitoring of human settlements development using sustainability indicators.



MCA-scheme of FIN.30



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17

Demands and constraints of MCA

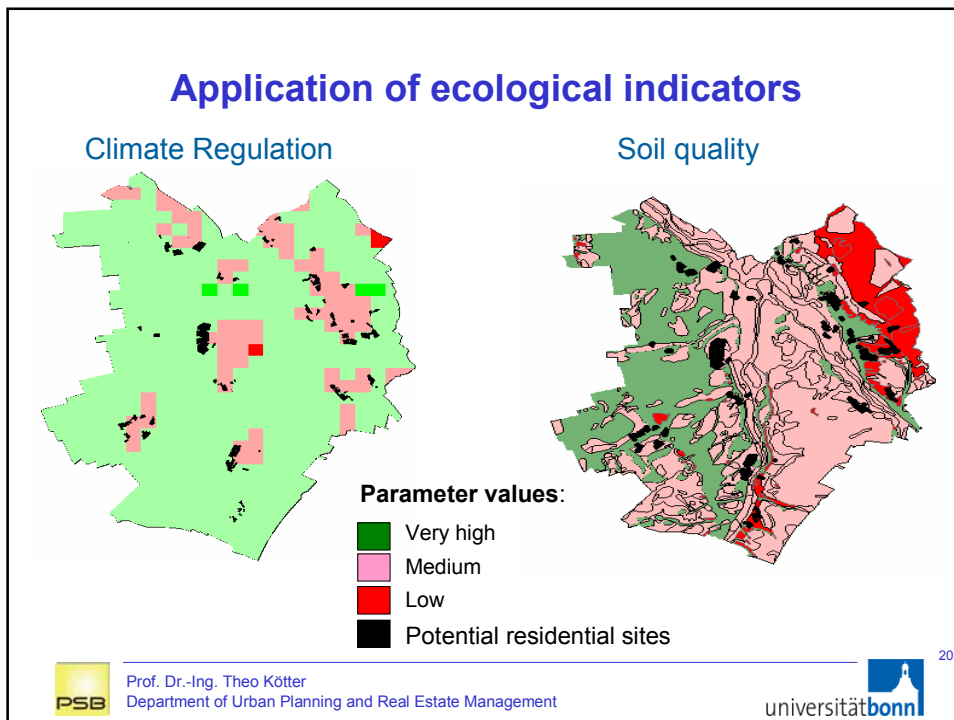
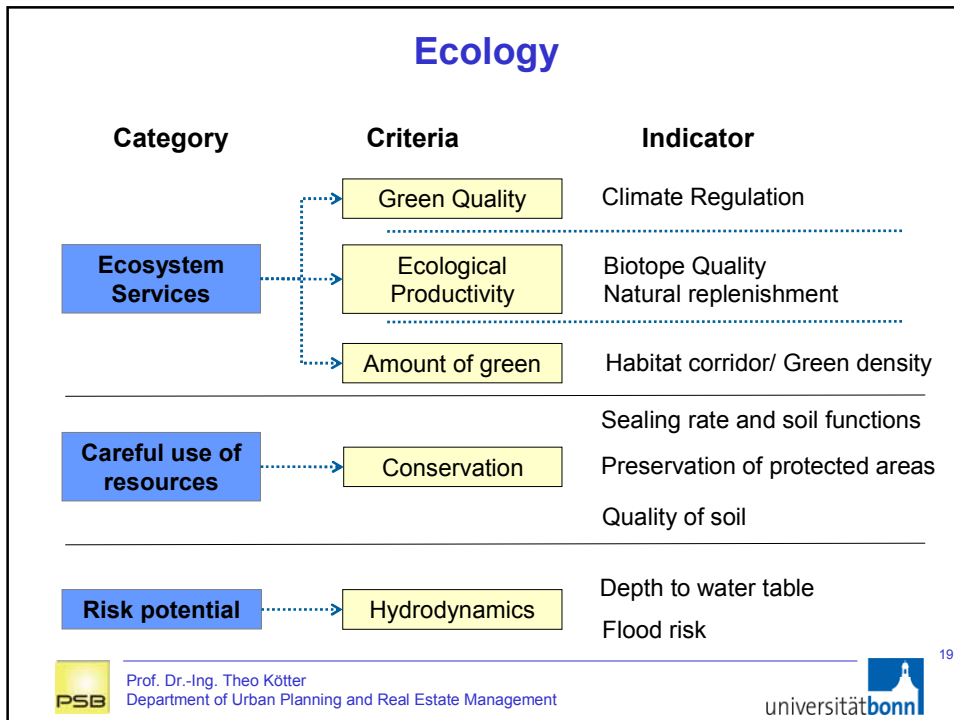
- Complexity of sustainability requires a mix of **quantitative and qualitative** criteria.
- Technical influences such as the **availability of data** essentially determine the **choice and applicability** of the indicators.
- The choice of the indicators is close related to the question of **planning relevance**
- These constraints **limit a scientifically consistent** operationalisation of sustainability in case of settlement development.

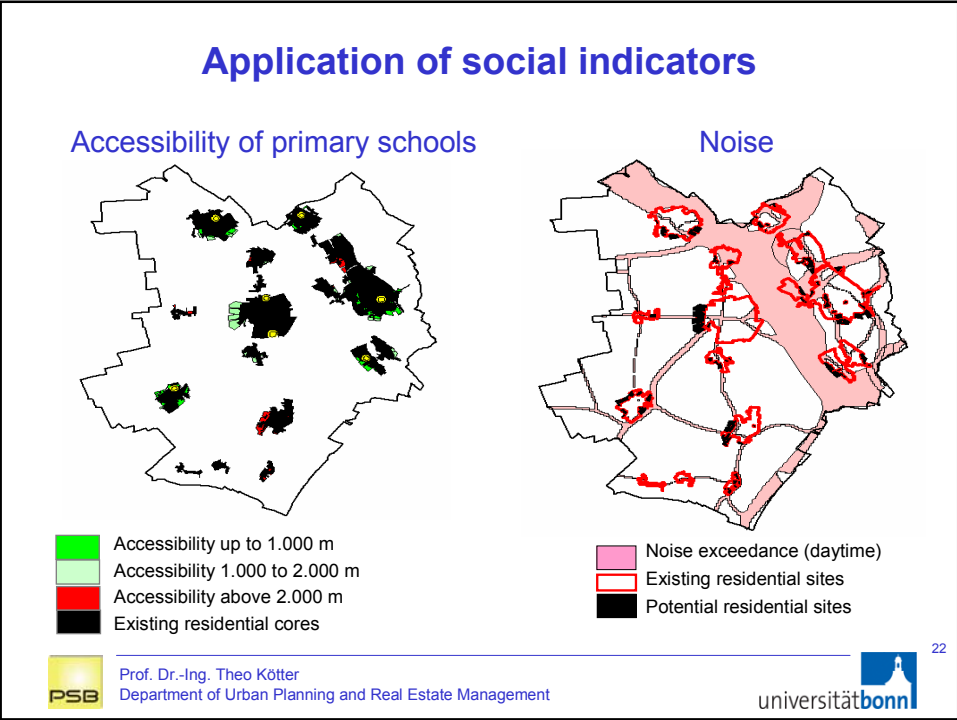
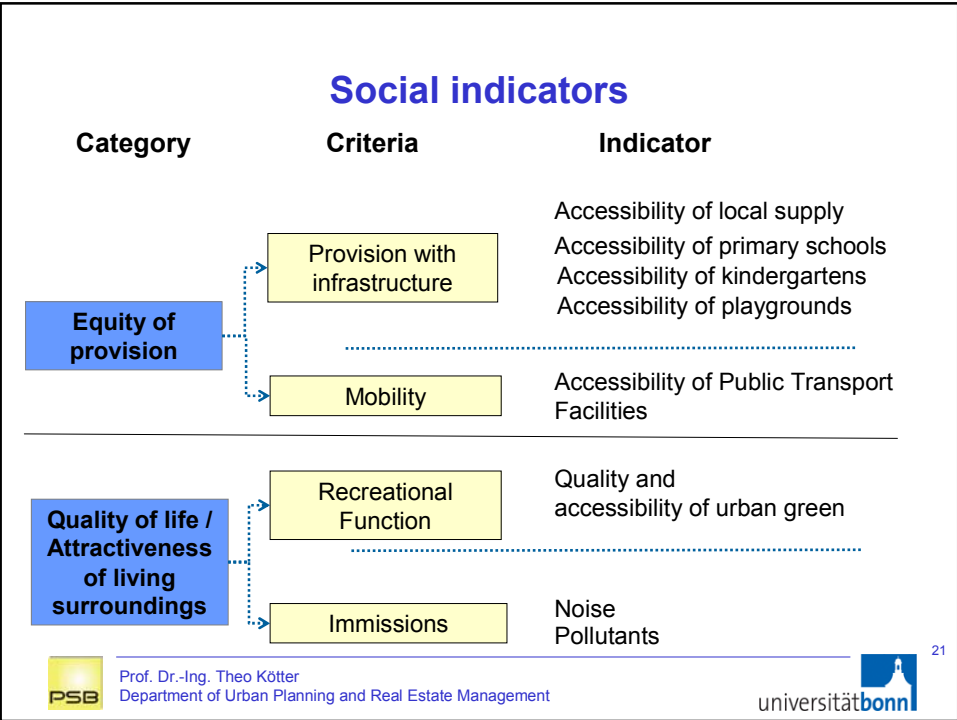


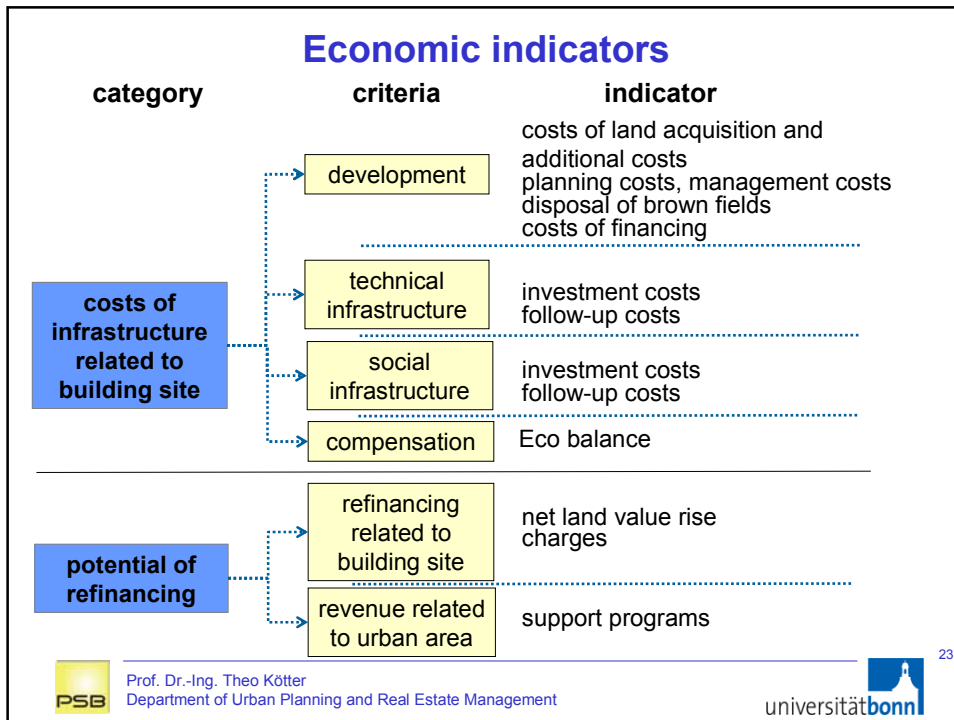
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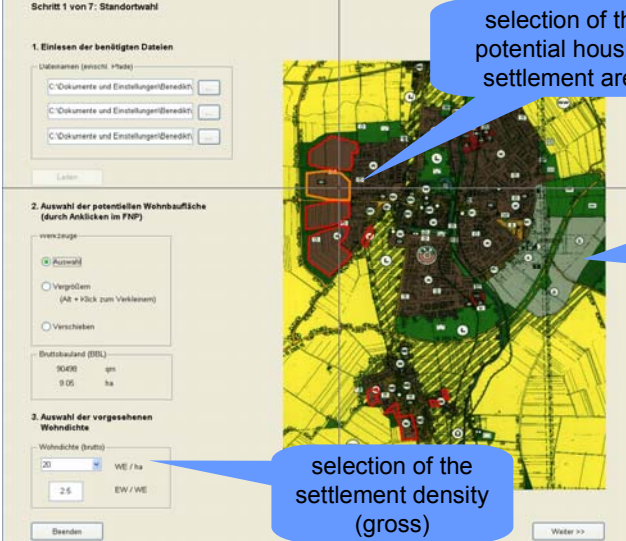
18








Application of economical indicators




selection of the potential housing settlement area

preparatory land use plan of the city of Erfstadt, Germany

selection of the settlement density (gross)

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Application of economical indicators

summary of the calculated costs

visualization of the calculated costs related to different dates of realisation

Gesamtkosten der Infrastruktur pro WE

Realisierung	Vorbereitung und Durchführung	innere Erschließung	äußere Erschließung	soziale Infrastruktur	Ausgleichs- und Ersatzmaßnahmen
in 0 Jahren	~3.2	~0.5	~0.2	~0.1	~0.0
in 5 Jahren	~3.5	~0.5	~0.2	~0.1	~0.0
in 10 Jahren	~4.0	~0.5	~0.2	~0.1	~0.0
in 15 Jahren	~4.5	~0.5	~0.2	~0.1	~0.0

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Decision-making support by GIS

Selection of value classes deriving from GIS-data

Final aggregation of all indicators

Expert-based manual insert of weights

Ecological Assessment: Results

Indicators	Values deriving from GIS	Indicator Weighting
1. Regulationseffekt	Klassen 0-3	10
2. Biotopqualität	Klassen 0-2	0
3. Versickerungspotenzial (Kf-Wert)	>100	0
4. Isolationsgrad	keine Inanspruchnahme	30
5. Versiegelung/ Bodenfunktion	Bodenfunktion 0- 3 sowie Versiegelun	0
6. Schutzgebiete	keine Lage in Schutzgebiet	30
7. Bodenwertzahl	<5	10
8. Grundwasserbeeinflussung	ke	10
9. Hochwassergefährdung	ke	10

Do not exceed 100%

Sophie Schetke 2008 University of Bonn

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Decision-making support by GIS

output of indicator values: quantitative and qualitative assessment

potential residential sites

Indicator	Value
Shape	Polygon
Klima_bewe	bedingt geeignet
Bioto_p_bew	geeignet
Versiegelu	unbedenklich
Energiegun	keine
Bodenbewer	ungeeignet
Versickeru	bedingt geeignet
Gebietsna	Lech2
Isolations	geeignet
Ausg_bewe	geeignet

27

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Conclusions

- A comprehensive MCA-scheme is an important step towards a **transfer and communication of scientific knowledge** into local planning and land management approaches.
- The synthesis of a consistent and scientifically representative MCA-scheme towards an **applicable, decision - and policy - relevant assessment framework** for municipal planning is a crucial task.
- The discussion of demands of sustainability indicators schemes shows that in most cases great effort has to be put into **bridging the gap between scientific consistency and practical applicability** of such a assessment scheme.
- It is not the main task of the MCA-scheme to solely promote modest and adequate density related to consumption of natural resources - especially the resource land and soil – but it shall increase **transparency and rationality of local decision-making process** of settlement development.

Thanks for your attention!



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29