Between fallow land and land use competition
- Land use changes and conflicts in rural and suburban areas -

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Worldwide shortage of land and especially of arable land will accelerate in the next decades.

Introduction

Food security and production
Growing world population

From 7 billion in 2011 to 8.9 billion in 2050. Demand of food increases rapidly, leading to more residential land and arable land.

The world's population

Resources: WORLD POPULATION TO 2300 – United Nations
Food security and production

2004: demand of land exceeds **400 m²/capita** the available land

Source: Wuppertal Institut; Fraunhofer Institut 2010

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Food Production

changing consumer behavior and eating habit

- Meat instead of crops and vegetables
- Increasing demand for arable land
Energy supply

To produce renewable energy, like solar power, bio fuels, wind parks, geothermie

Increasing demand for land

The Three Gorges Dam is a hydroelectric dam in China, which took over 28,000Ha agricultural land to be build.

Urban growth

More than 50% of the world’s population live in cities since 2010.

The fast growing and sprawling urban agglomerations and cities are situated in regions with fertile soil

Every year 19.5 million hectares of agricultural land is converted to spreading urban centres and industrial developments
Trends in regional urban development

- Urban sprawl
- Suburbanization
- Functional segregation
- Fragmentation
- Dispersion

Land use in China

Arable land per capita:
- China: 0.11 ha
- World's average: 0.23 ha

Trends 1991-2000:
- China's population has increased annually by 12.5 mio.
- Nearly 10 mio. ha cropland area was converted into built up, forest land and others or destroyed by disasters like natural hazards and land degradation
Development in BTH-Region

1990-2000
• expansion of urban area: 71 %
• max. annual growth rate: 5.5 %
• Land expansion rate was faster than urban population increase rate in the last decade
• loss of farmland: 310,000 ha/a
• fragmentation of land use
• fastest growing of small cities < 100,000

M. Tan et al. 2005

Challenges of land use in the BTH-region

Beijing Land Use Map in 1990 (Xie et al. 2007)
Beijing Land Use Map in 2000 (Xie et al. 2007)
1. High economic growth in 2009: GDP 11.2%

2. Mass migration from rural to urban areas. Most important driving force in small cities is the rate of available urban land per capita:
   - small cities: 233.2 m²
   - large cities 114.3 m²

3. Strict household registration systems and urban development guidelines held back the migration from the medium and large cities: growth rate of the small cities was much faster

4. Governance: Planning decision of local leaders to convert land because they believe, that urban land is more profitable than agricultural land on a long term

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Driving forces

- Climate change
- Land desertification
- Rise of the average temperature
- Droughts facilitate land use change

It has been estimated that 10–20% of drylands are already degraded, the total area affected by desertification being between 6 and 12 million km²
Sea level measurements in geologically stable environments show a rise of around 200 millimeters (8 inches) per century, or 2 mm/year. IPCC models suggest that 33% of the global coastal wetlands will be under water by the year 2080.

Environment Protection

To keep ecological systems and their functions and also the biodiversity, often more extensive zones are needed.

Riau, Indonesia, to protect the biodiversity 526.548 Ha extra land in the centre area.
Multifunctional land use

Basic functions
- Biodiversity
- Soil development
- Natural resources
- Provision of water

Production functions
- Production of food
- Wood
- Energy
- Renewable resources

Regulation functions
- Climate regulation
- C storage
- Retention of flooding
- Cleaning of water, air

Cultural functions
- Recreation
- Identity
- Cultural diversity

Urban functions
- Housing
- Commercial zones
- Infrastructure

Eco-system services

Public and private goods

MEA 2005,

System of Land Use and Land Management

Land Policy, Land Management Framework

Controlling

Ecology
- soil
- water
- climate
- air

Economy
- Consumption behavior
- Distance to market
- Prices
- Structure of the agricultural sector

Social structure
- Population
- Demographic change
- Tourism

Spatial structure
- Location
- Traffic
- Infrastructure
- Topography

Types of land use

Urban land
- Buildings
- Infrastructure
- Open spaces

Agricultural land
- Cropland
- Green land
- Horticultural land

Forest
- Mixed forest
- Nadelwald
- Laubwald
- KUP

Water
- Ground water
- Lakes, rivers

Others

Functions of land use

Urban functions

Cultural function

Regulation

Production

Basic functions
Visions and Strategies

Vision of post oil city: Compact, mixed land use, short distances

Problem:
Difference between physical and social structure

Songdo city in South Korea, the 9 million square metres master plan includes commercial office space, residences, retail shops, hotels as well as civic and cultural facilities.

Formal Land Use
- Stores
- Factories
- Park
- Apartments
- Bungalows
- Road
- Vacant

Functional Land Use
- Commercial
- Industrial
- Leisure
- High density residential
- Low density residential
- Transportation
- None

Agriculture in metropolitan areas

- Vertical Farming
- Sky Farming
Regional Masterplan Land Use

Social aspects
- Land tenure
- Infrastructure

Economic aspects
- Natural resources
- Biodiversity

Settlement
- Masterplan
  multifunctional land use

Conclusions

Targets
- Post oil settlements (compact …)
- Support of infill development
- Preserve open spaces and landscape
- Effective and efficient land use

Strategies
- Monitoring of land use (world wide)
- Assessment of eco system services of land use
- Regional master plan land use
- Land management
Thank you very much!