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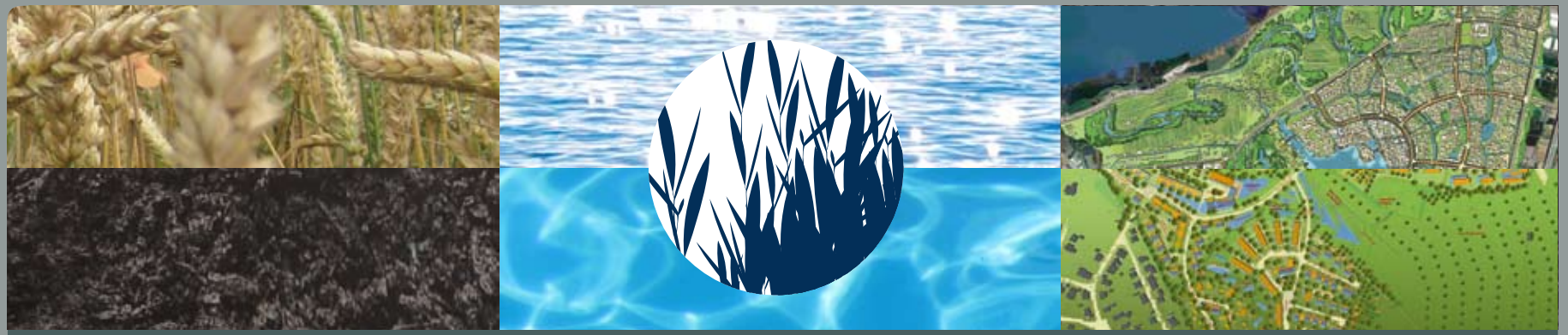
areal® GmbH – future solutions



There are many challenges that our society is facing:
• Climate change • Exhaustion of resources • Environmental conflicts
These challenges will become worse in future due to:
• enlargement of the world population (9 billion in 2030) • increasing need of access to drinking water • increasing pressure of agricultural used fields
New sustainable water and land use strategies, protecting our foundation of life, are highly required
Combined multiple environmental management and socio-economical as well as ecological tools for maximal resource protection are needed

areal company offers future solutions in the fields of • water economy • management of sustainable land use and • agro-urban resource management systems (Oasis21),

whereby the principles of sustainability are implemented consequently

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areal® GmbH – the company

Clear, clean water stands for nature and health, while fertile earth is the foundation for growth and life. We, here at areal, the market leader in middle Europe, consider the preservation of these precious goods, as not only a question of the consequent utilization of modern technical means, but also one of ecological imagination and long experience.

areal® was founded in 1994 by the director Joachim Böttcher. Areal started by focussing development, planning and implementation of nature based waste water treatment plants, following the principles of circular flow economy.

In cooperation with partners of universities and further research institutions, the first research projects in the field of special waste water treatment already started in the 90ties. In the german speaking area, but also in other european countries, areal realized the „turnkey“ implementation of hundreds of plants in nearly all fields of sustainable water economy. Meanwhile also the key technology of „Terra Preta“ is part of the product equipment of land use management.

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A combined multiple System of water economy and land use leaded to a new business field: the areal®- agro-urban resource management systems, which are future-orientated. Furthermore these systems enable Oasis 21-conceptions as a holistic solution, based on a zero-emission-material flow management.

This future development is the result of the company´s strategy, focussed by the director Joachim Böttcher, working as a team with:

- **Civil engineers • Architects • Engineering draftsmen • Environmental scientists**
- **Agrarian engineers • Horticulture experts • Soil scientists • Construction- and process engineers**

As a team we aim at reaching the final completion together

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areal® GmbH – sustainable water economy

The pressure on using the resource water has already caused dramatic consequences in many parts of our earth. Caused by increasing pollution of ground water and other types of water, a strengthened use of water for agriculture and in towns, clear, clean drinking water runs more and more shorter. Only for irrigation processes approximately 70% of the world wide water demand is used.

- **1,4 billion humans worldwide don´ t have access to drinking water!**
- **2,6 billion humans world wide don´t possess sanitary installations!**

The water economy of the future has to accept the use of parts of the waste water as a resource with a high value! New treatment technologies will focus on splitting and re-use of usable ingredients, for example to produce a high-quality humus substrate or a plant nutrient. The use of treated waste water as service water or irrigation water for the agri-culturefield will get a high priority.

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areal® GmbH – sustainable water economy

areal® offers solutions for:

- Municipal waste water treatment plants
- Commercial waster water treatment plants
- Special waste water plants
- Agricultural waste water treatment plants
- Solutions for buildings and town quarters

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areal® GmbH – sustainable water economy

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areal® GmbH – sustainable land use management

As a consequence of the population growth and the extension of energy plants cultivation at the same time the pressure of using agricultural areas increased tremendously.

Following soil degradation processes will speed up in future:
• erosion • salinization • acetifying • densification

2 billions hectares farmland and grazing land are already degraded worldwide, which makes a further agricultural utilization impossible. These are at least 15% of the world wide allocated areas of utilization.

At the moment a compensation can be reached through:

• raising mineral fertilizer operation • increase of chemical methods to protect plants (which are mostly produced by high fossil energy use) • clearing of new forest areas
• The current land utilization leads into an enormous release of carbon dioxide and further harmful gases for the climate!

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areal® GmbH – sustainable land use management

Soil (especially humus) serves as an elementar carbon dioxide storage. Wrong soil cultivation and utilization leads into following consequences:

• soil erosion • dehydration

This causes dissolution processes of carbon stores and the release of carbon dioxide.

Up to the year 2030 the double amount of food must be produced in comparison with today´s production to feed the world´s population. To reach this target the world´s utilization of soils play an elementary role according to the climate protection. Furthermore the future new circulation orientated and resource protecting methods must be developed and realized in a short time.

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areal® GmbH – sustainable land use management

The company´s director Joachim Böttcher and his team has succeeded in the reproduction process of Terra Preta do indio, which scientists tried up to date in vain. Terra Preta is an anthropogenic black soil, which has been produced by the early cultures of the Indios, living in the amazonas area, a long time ago. As input material they used biological residues and faeces. Today Terra Preta is among the most fertile soils in the world. The rediscovery of Terra Preta can contribute to solve many current environmental problems, e. g. as a contribution to climate protection or re-utilization of damaged soils.

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areal® GmbH – sustainable land use management

areal® offers solutions in the following fields:

- Construction of preparation plants for utilization of biological residues in agriculture and horticulture
- Development and planning of new agricultural methods within the frame of a sustainable resource management
- Re-utilization concepts of degraded soils
- Plants and concepts to manufacture high-class humus substrates and Palaterra-products

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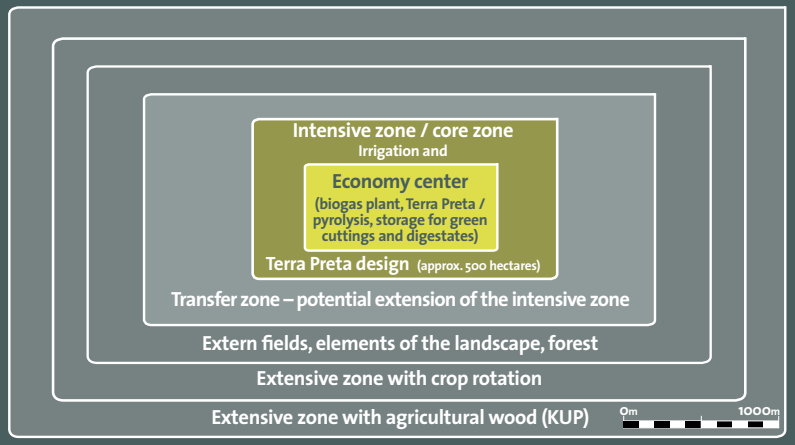
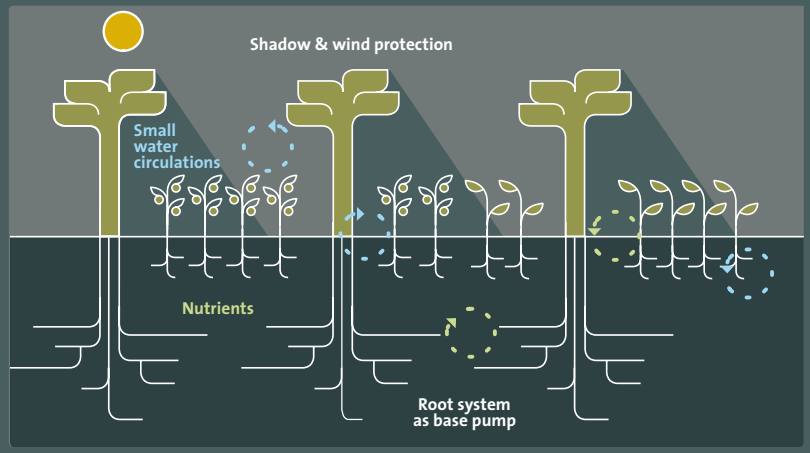
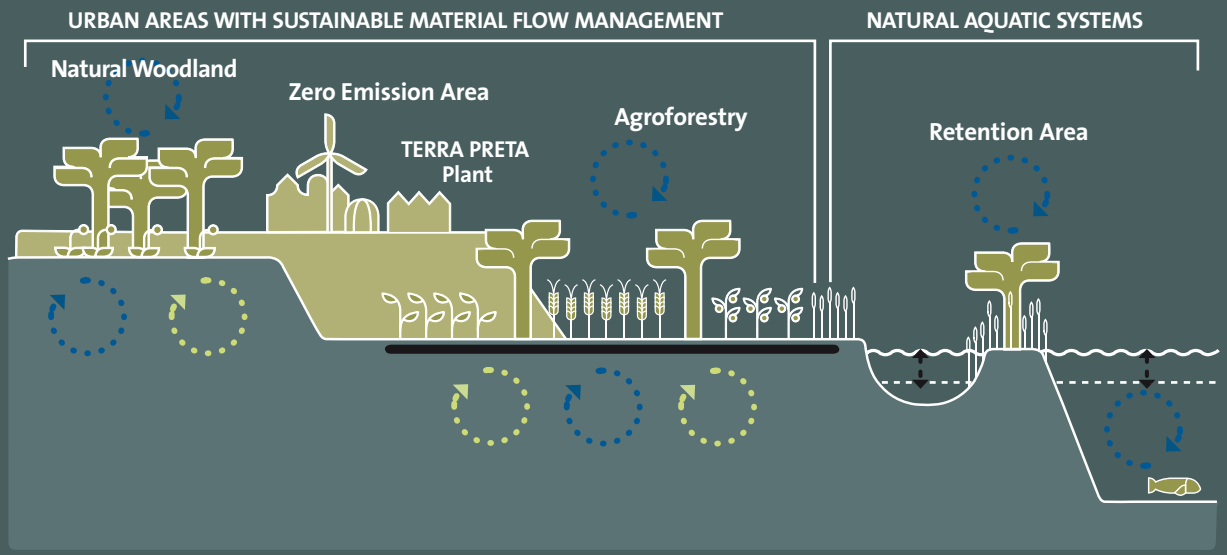
areal® GmbH – sustainable land use management

Zones of biomass center, implemented in marginal profit soils



agroforestry system





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areal® GmbH – sustainable land use management

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areal® GmbH – agro-urban resource management systems

A combined multiple system of water economy and land use enables an activation of unused potentials and synergies to reach a qualified growth. With such a system a lot of current problems can be solved and the resource utilization of so far systems can be designed much more efficient.
The solution strategy of areal® is called Oasis21 and follows the principle of zero-emission-material flow management. It considers economical and ecological criterias as well as challenging social principles.

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areal® GmbH – agro-urban resource management systems

areal® offers solutions for supply and disposal of settlements, villages, „new towns“ and town quarters with the long-term objective of a sustainable agro-urban resource management:

- **Receiving, preparation and upgrading of waste water and biological residues from defined catchment areas**
- **Supply of the catchment area with service water, food and energy**
- **Creation of sozio-economical facilities like community garden construction, cafe, rooms for communication, market hall etc. inside Oasis21**
- **Ambitious building design**
- **Implementation of the agro-urban system design into the town planning**

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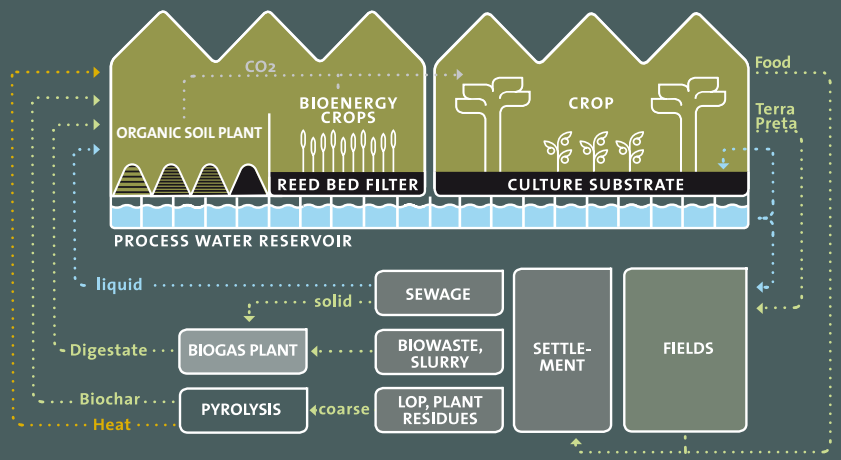
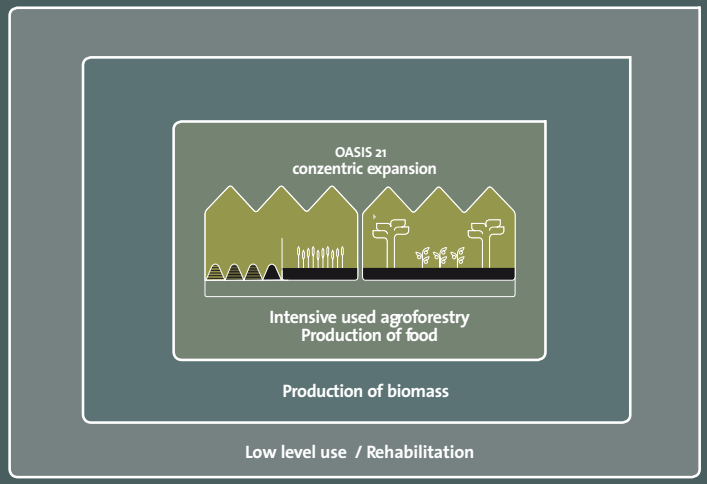
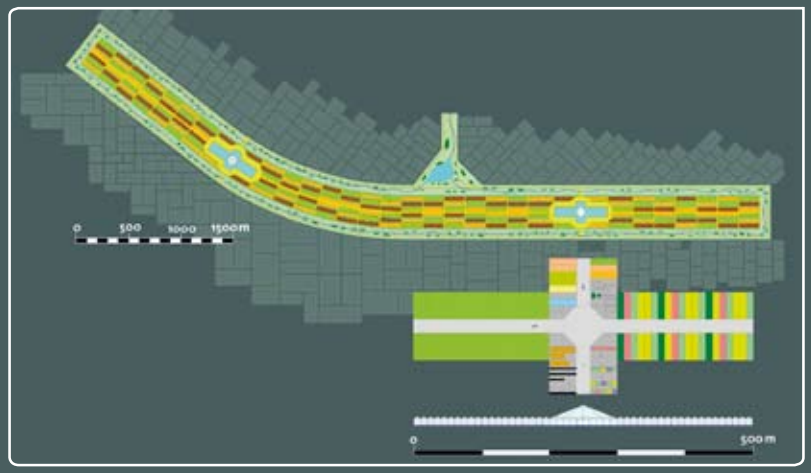
areal® GmbH – agro-urban resource management systems



Oasis 21 - New potentials in land use



Abu Dhabi



Pfaffenhofen

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areal® GmbH – business field research & development

In the forge of ideas, innovative processes and concepts will be developed. In the field of research and development those concepts & processes will be developed through laboratory analyses and field trials up to a marketable commodity. Studies and networking research will enable the practicable realization inside projects.

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areal® GmbH – business field engineer service

areal® realizes projects in the business field of engineering service. In conversation with the clients we attend projects individually with all the engineer services:

- from counseling up to documentation
- from preparation planning up to approbiation
- from assignment up to construction attendance

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areal® GmbH – a choice of projects

- DBU 1998: networking research project „nature orientated treatment of winegrowing waste water“
- BASF 2002: field trials with a plant for seepage water of landfills
- Environmental ministry Rhineland-Palatina 2006: study „environmental campus Birkenfeld“
- Environmental ministry Rhineland-Palatina 2008: study Morbach
- Agroscience Neustadt/Weinstr. 2009: germ and growth trials
- GTZ 2009: greening of a desert in Qena, Egypt
- BMBF 2008-2011: concepts for preparation of agricultural residues (digestates) in the rural area (Shaanxi province), China
- GTZ, IfaS since 2008: new construction of a town, Lakhiaita
- FH Weihenstephan 2010-2011: improvement of substrates, plant trials
- BMBF 2010: study botanical garden Addis Abeba
- GTZ 2011: masterplan for water economy, Marokko
- BMBF 2010-2014: networking research project LaTerra
- BMBF 2011-2015: networking research project Zero-Emission-communities

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areal® GmbH – References engineering service: a choice of projects

- **Waste water disposal concept in the communities of Rockenhausen, Ammeldingen, etc.**
- **Various municipal waste water treatment plants: Marienthal, St. Alban, Ammeldingen, Perl-Büschdorf, Kriegsfeld, etc.**
- **Various commercial plants: Fußgönnheim, Mutterstadt, Reinheim, etc.**
- **Special waste water treatment plants: ZAK, BASF, etc.**
- **Palaterra plants: Hengstbacherhof, Morbach**

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areal® GmbH – International references

- Qena, Egypt: energy plants in the desert
- Croatia: peripheral waste water treatment in the rural area
- Lakhiaita, Marokko: new construction of the town
- Fes, Marokko: recycling plant for dairy waste water (Domaine Royal)
- Addis Abeba, Ethiopia: Palaterra-concept for botanical garden
- Shaanxi province, China: concepts for preparation of agricultural residues (digestates) in the rural area

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areal® GmbH – cooperation partners & memberships

Cooperation partners:

- Juwi group, Wörrstadt
- Roediger vacuum company
- Igr AG, Rockenhausen
- Agroscience company, Neustadt, Weinstr.
- Institute for applied material flow management (IfaS)
- Association for technical cooperation (GTZ)
- Technical university Kaiserslautern (TU)
- University Mainz
- College Bingen (FH)

etc.

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areal® GmbH – cooperation partners & memberships

memberships:

- German corporation for garbage and waste water economy (DWA), Bonn
- BDZ, Leipzig
- Association economy and environment, Mainz
- Engineer ecological association (IÖV), Augsburg
- German water partnership (GWP)
- IHK, Pfalz
- Environmental technology Rhineland-Palatina, Birkenfeld

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areal® works active in the DWA-working group „new sanitary systems“ (NASS), whereby recently guidelines have been developed and set the first time according the future-orientated topic „sustainable water economy“. Furthermore areal is involved in other working groups of the engineer association (IÖV) and in numerous networking research projects.

We deliver ideal components to realize the DGNB-criterias for housing development

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Thank you very much for your attention

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