Sustainable Management of River Oases along the Tarim River (SuMaRiO)
Outline of the regional problem

Conflicts:
- Water use
- Land use
Outline of the regional problem

**Effects:**
- Land degradation
- Desertification
- Loss of Biodiversity
- Loss of ecosystem services
Effects:

- Land degradation
- Desertification
- Loss of Biodiversity
- Loss of ecosystem services

The question is how to manage land use, i.e. irrigation agriculture and utilization of the natural ecosystems, and water use in a very water-scarce region, with changing water availability due to climate change, such that ecosystem services and economic benefits are maintained in the best balance for a sustainable development.
SuMaRiO - Sustainable Management of River Oases along the Tarim River
6th Sino-German Workshop on Biodiversity Conservation, Mi., 17. July 2013, BfN, Bonn- Dr. C. Rumbaur

Project structure

**WB 1: Organization**
- WP 1.1: Project coordination and equipment management
- WP 1.2: Scenario management
- WP 1.3: Stakeholder dialogue and coordination of knowledge transfer
- WP 1.4: GIS and DATA management

**WB 2: Regional Climate Change and Discharge of Tarim Tributaries**
- WP 2.1: Monitoring and modeling of cryosphere
- WP 2.2: Regional climate scenarios and medium-term forecast of precipitation
- WP 2.3: Climate change impact on water discharge

**WB 3: Sustainable Water and Landuse Management in the Tarim Basin**
- WP 3.1: Water requirement and water quality on the plot scale (0.1 km²)
- WP 3.2: Hydrology, salinity and biomass production on the local scale (10 km²)
- WP 3.3: Upscaling to the regional scale (200 km²)
- WP 3.4: Modeling of the water balance along the Tarim River (1000 km)

**WB 4: Ecosystem services and Ecosystem functions along the Tarim River**
- WP 4.1: Ecosystem services and Ecosystem functions of riparian ecosystems and aquatic biodiversity
- WP 4.2: Ecosystem services and Ecosystem functions of non-irrigated land use systems
- WP 4.3: Ecosystem services and Ecosystem functions of urban and peri-urban oasis vegetation

**WB 5: Multi-Level Socio-Economic Assessment of Ecosystem Services and Implementation Tools**
- WP 5.1: Multi-level economic system assessment
- WP 5.2: Transdisciplinary assessment of ESS for urban areas regarding dust and heat stress
- WP 5.3: Actor-based decision support for land and water management

**GLUES**
Global Assessment of Land Use Dynamics on Greenhouse Gas Emissions and Ecosystem Services

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Ecosystems monitored

Ecosystems:
- Natural Forests and vegetation (Tugai vegetation)
- Agricultural Land
- Urban and peri-urban vegetation

Scenarios:
- Shallow to deep groundwater level
- Low to high wood use (pollarding)
- None to high soil salinity
- Irrigation method
- Alternative production systems (Apocynum) cotton
- Indigenous practices to modern city parks
## Ecosystem services assessed

<table>
<thead>
<tr>
<th>Service Type</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Provisioning services</strong></td>
<td>Household water supply, fish catch, livestock production, wood supply</td>
</tr>
<tr>
<td><strong>Regulating services</strong></td>
<td>Shelter from sand drift, soil erosion, dust weather &amp; sandstorm</td>
</tr>
<tr>
<td><strong>Cultural services</strong></td>
<td>aesthetic appreciation</td>
</tr>
<tr>
<td><strong>Supporting services</strong></td>
<td>Habitats (for unique plants &amp; animal species), biomass production</td>
</tr>
</tbody>
</table>
Outcome of the project: Decision support system

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“Economy & Ecology” scenarios
“Climate & Hydrology” scenarios
External scenarios

Decision maker / User

Alternatives
e.g. measures, options, combination of measures
Integrated River Basin Management

Consequences / Effects
• Selection and weighting of problem-specific and crucial indicators
• Analysis of trade-offs and synergies

Indicators system
Characterization of the project area
Evaluation of alternatives

Decision Support System (DSS)

Source: M. Hinnenthal, Universität der Bundeswehr München, Germany

Legend

→ Influences
← Input / Output
→ Decision process

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Thank you for your attention
Figure 1: The importance and degree of involvement of stakeholders in sustainable land management (SLM) in the Tarim River Basin.

Source: Tuck Fatt Siew, Universität Frankfurt, Germany