Project Partners

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- Advanced Technology and Science Hall, Slippery Rock
- Catholic University Eichstätt-Ingolstadt
- Eidgenössische Technische Hochschule Zürich
- Ernst-Moritz-Arndt-Universität Greifswald
- Freie Universität Bozen
- Helmholtz-Zentrum Potsdam, Deutsches GeoForschungsZentrum
- Hochschule für nachhaltige Entwicklung Eberswalde
- Johann Wolfgang Goethe-Universität Frankfurt am Main
- Potsdam-Institut für Klimafolgenforschung
- Technische Universität Berlin
- Technische Universität Dresden
- Universität der Bundeswehr München
- Universität Hohenheim
- Universität Trier
- Wasserwirtschaftsamt Ingolstadt

Chinese Partners:

- Xinjiang Institute of Ecology and Geography, CAS, Urumqi
- National Climate Centre, CMA, Beijing
- Xinjiang University, Urumqi
- Cold and Arid Environment Research Institute (CAREERI), CAS, Lanzhou
- Nanjing Agricultural University, Nanjing
- Xinjiang Agricultural University, Urumqi
- Chinese Academy of Social Sciences, Beijing
- Institute for Remote Sensing Applications, CAS, Beijing
- Tarim University, Alar

Chinese Stakeholder:

- Xinjiang Science& Technology Bureau, Urumqi
- Xinjiang Water Resources Bureau, Urumqi
- Xinjiang Tarim River Basin Management Bureau, Korla
- Xinjiang Meteorological Bureau (XMB), Urumqi
- Xinjiang Agricultural Bureau, Urumqi
- Xinjiang Forestry Bureau, Urumqi
- Xinjiang Environmental Protection Bureau, Urumqi
- Xinjiang Stockbreeding Bureau, Urumqi

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Sustainable Management of River Oases along the Tarim River / China

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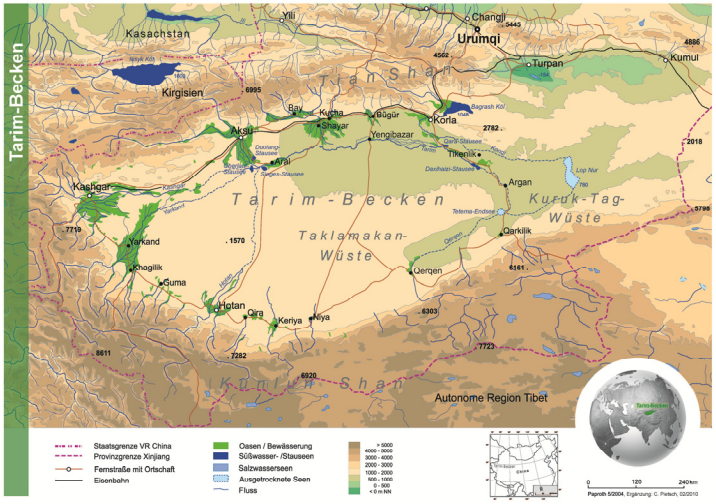
Introduction

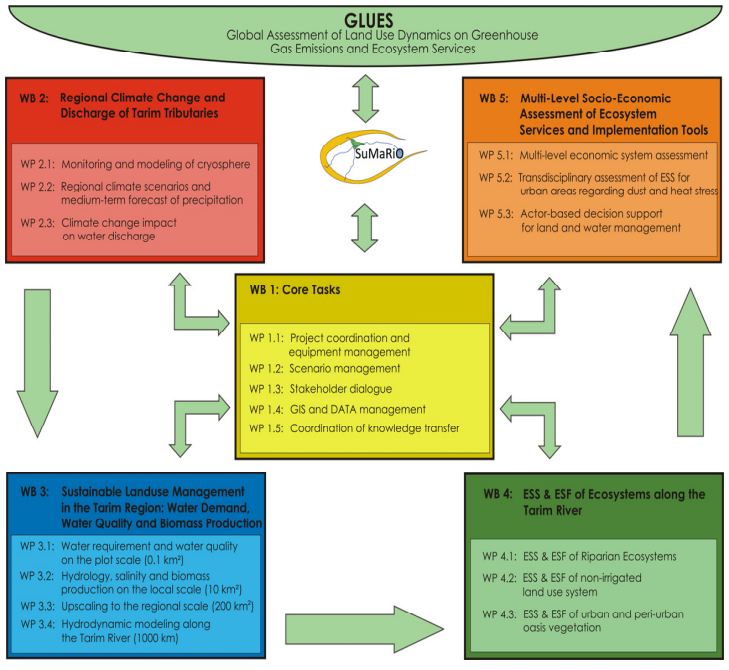
The Tarim River Basin is a large, unique and arid region of extreme vulnerability. The climate is continental with large temperature amplitude, annually and daily. It is, globally, the most remote area from the oceans; hence rainfall is extremely rare and low and does not exceed 50 mm per year. Thus, all kind of economic activities, especially agriculture and urban life, as well as the natural ecosystems depend on the river water as major water source. The Tarim River, which is the largest river of the Tarim Basin, is fed from snowmelt and glacier-melt in the mountains. The water discharge into the Tarim River has been increasing over the last decade. However, global climate change prognoses forecast a shrinking water supply within this century. Due to strong extension of irrigated agriculture in oases along the rivers since the 1950s river flows have strongly decreased, leading to a degradation of floodplain vegetation, while agricultural soils have become unusable due to salinization. There is a clear trade-off between generating income from irrigation agriculture, mainly cotton, at the cost of Ecosystem Functions (ESF) and Ecosystem Services (ESS) provided by the natural ecosystems.

The central 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.

Research Area



Project structure



Objectives

The overall goal of SuMaRiO is to support oasis management along the Tarim River under conditions of climatic and societal changes by:

- Developing methods for analyzing ESF/ESS, and integrating them into land and water management of oases areas and floodplain forests;
- Involving stakeholders in the research process to integrate their knowledge and problem perceptions into the scientific process;
- Developing tools with Chinese decision makers that demonstrate the ecological and socio-economic consequences of their decisions in a changing world;
- Introducing participatory approaches into the development of sustainable management structures;
- Jointly identifying options for optimizing economic, ecological, and societal utilities; and
- Implementation of sustainable land management strategies.

Research Objectives

- Estimation of the impact of climate change on water availability
- Determination of interactions of floodplain biodiversity and their ecosystem services
- Interlinkages between runoff characteristics / water quality / oasis management / ecosystem services
- Evaluation of traditional, high-input and alternative land use systems (ecosystem services / economic and social aspects)
- Transdisciplinary research by stakeholder participation
- Installation of various internet-based tools for supporting sustainable land management by quantifying system variables and ecosystem services