

Ecosystem Services and Related Sustainable Management of River Oases along the Tarim River in Northwest China



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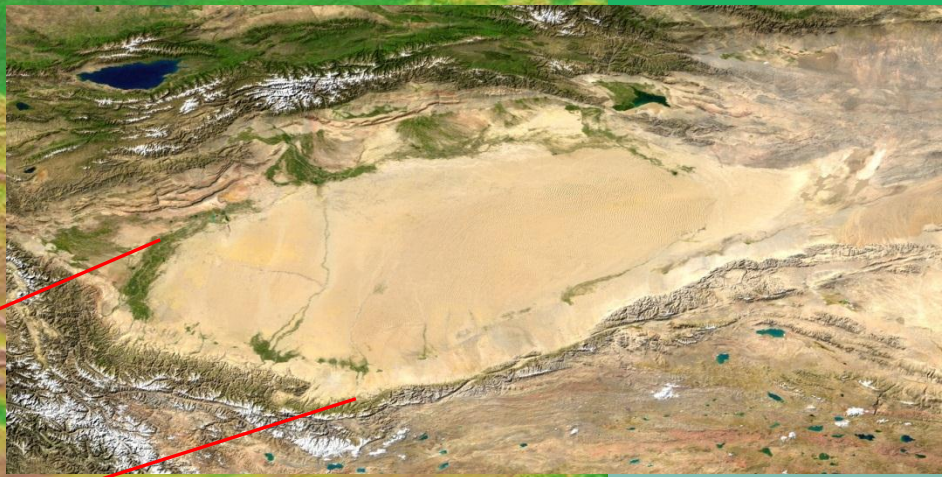
Germany



SuMaRiO – Sustainable Management of River Oases along the Tarim River

AGU 2011, Session H54B - Ecosystem Services: Hydrology and Biogeochemistry in a World of Environmental Change

December 9, 2011, M. Disse, P. Keilholz, C. Rumbaur, N. Thevs, B. Cyffka (mail to: markus.disse@unibw.de)



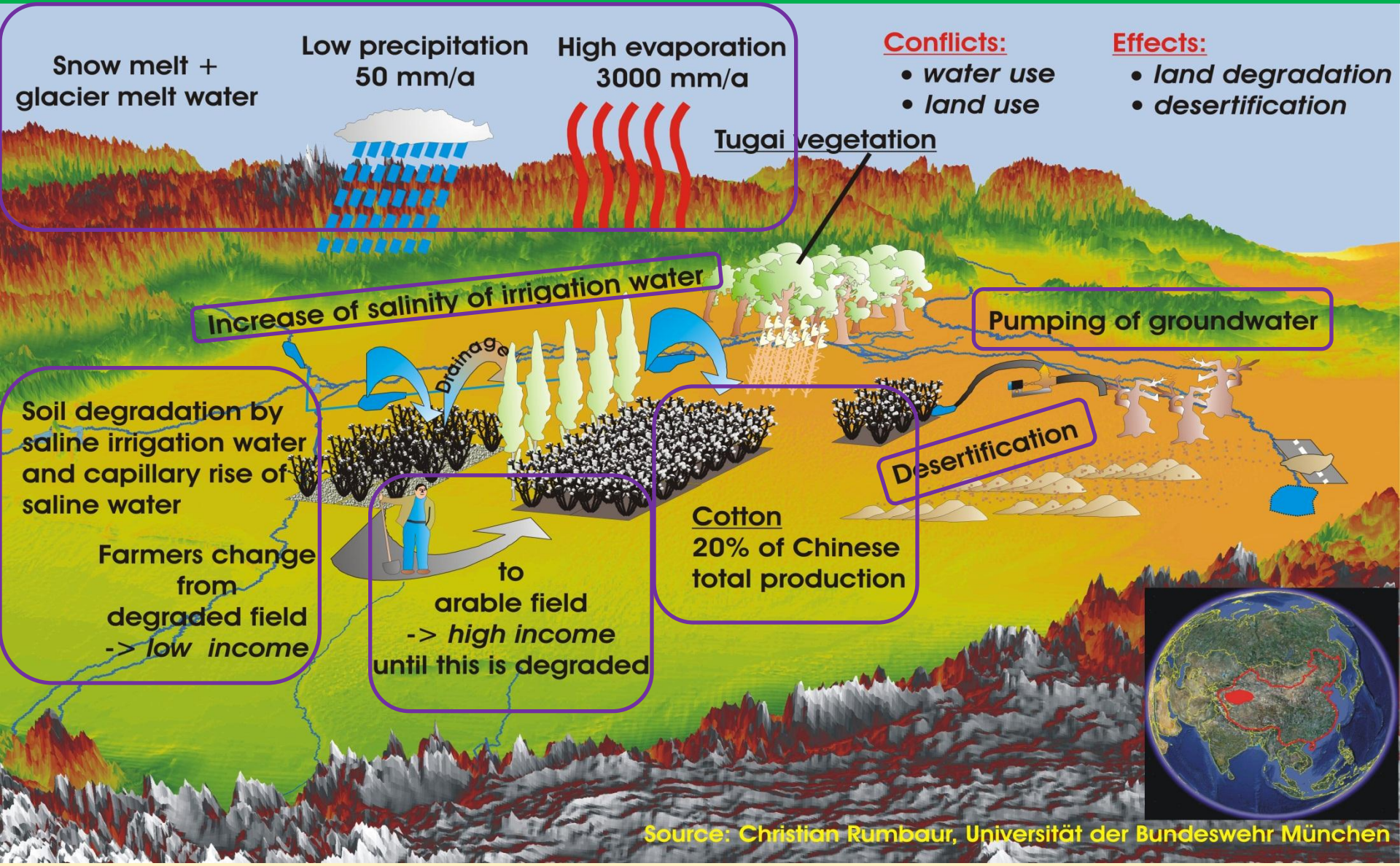
Current Situation in the Tarim Basin



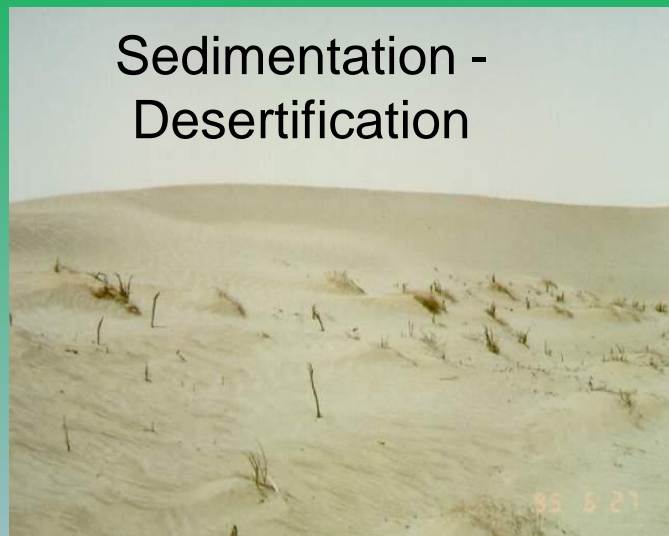
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Source: Christian Rumbaur, Universität der Bundeswehr München

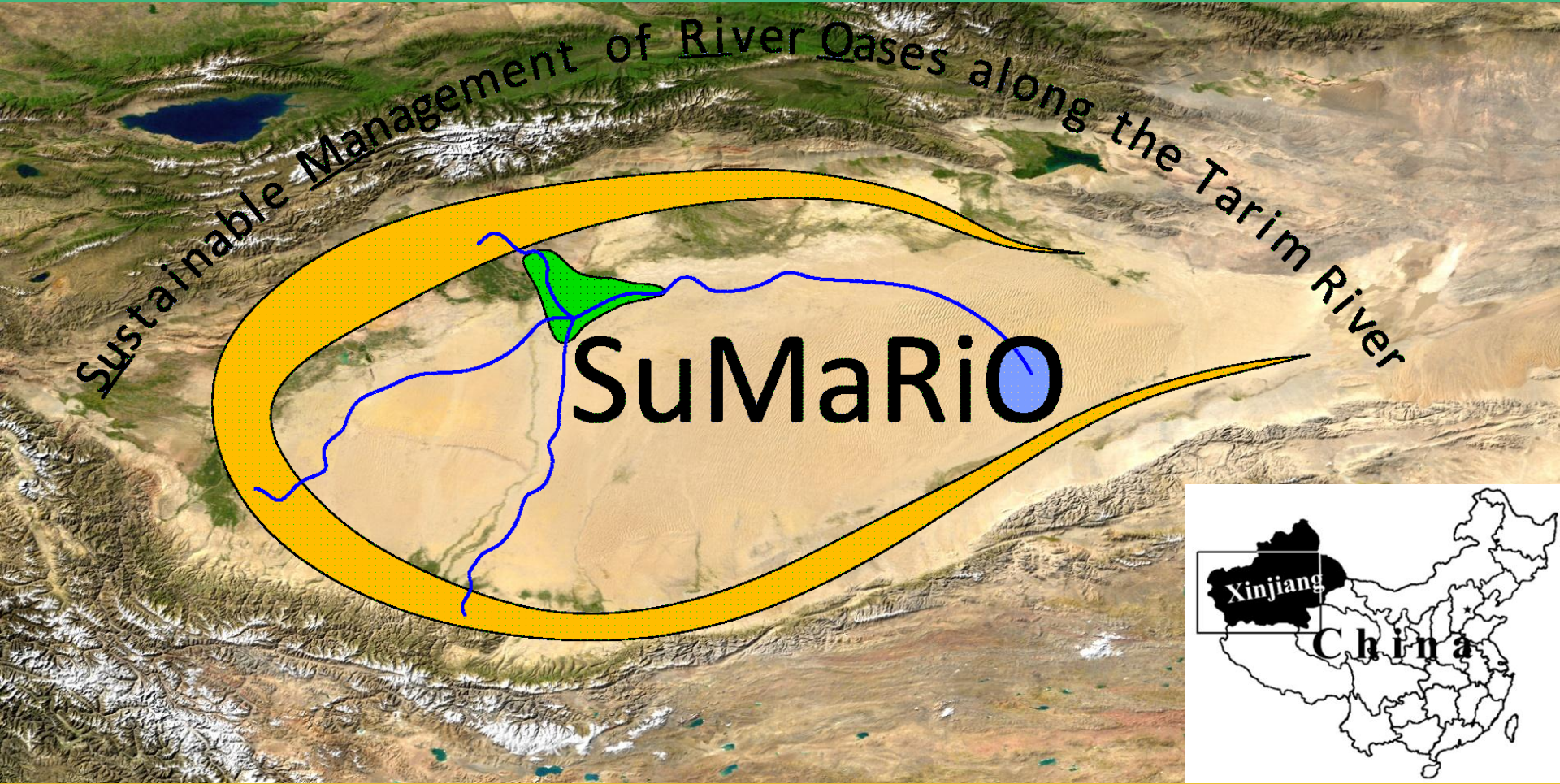


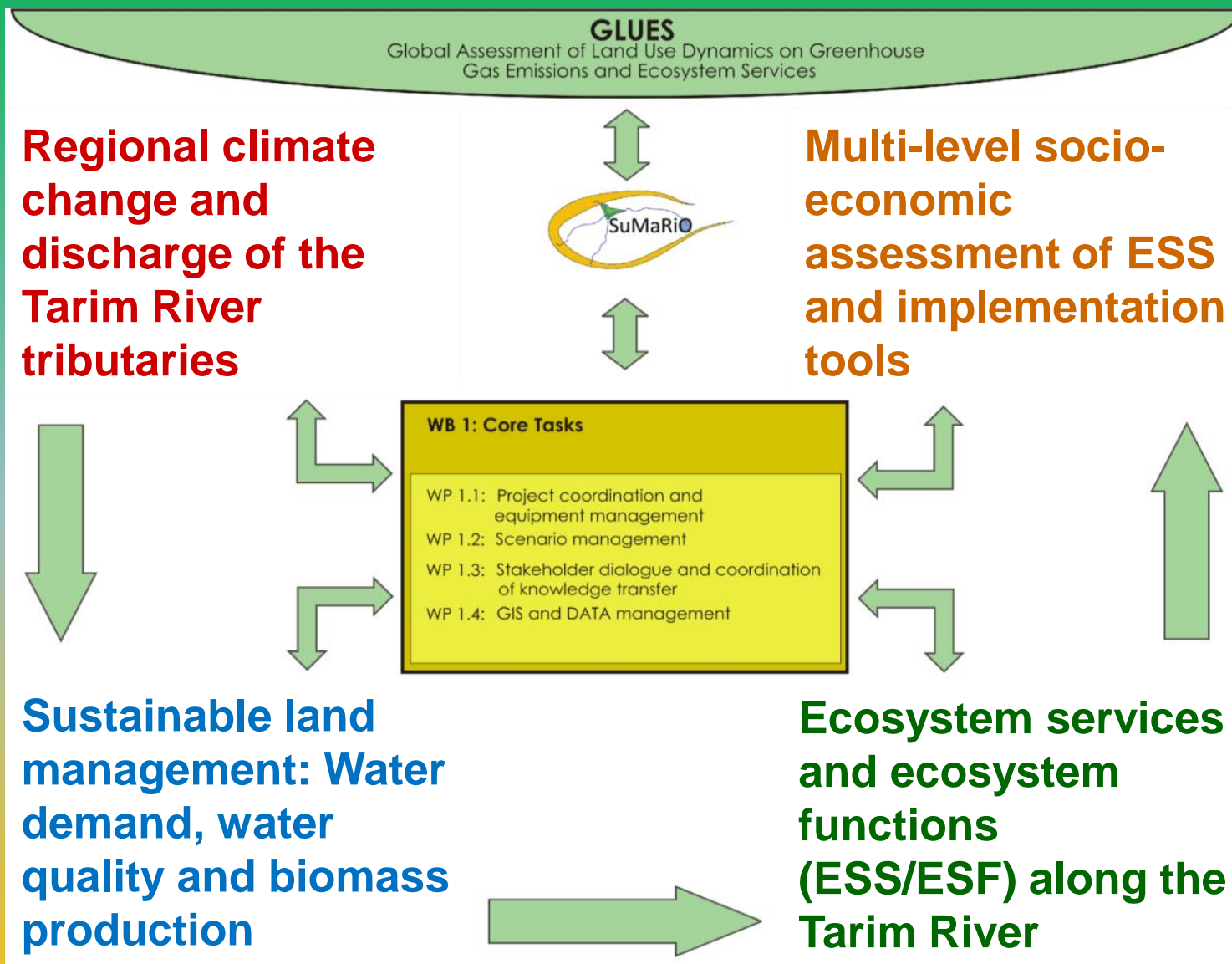
Ecological and Economic Consequences of the enhanced Irrigation Practice





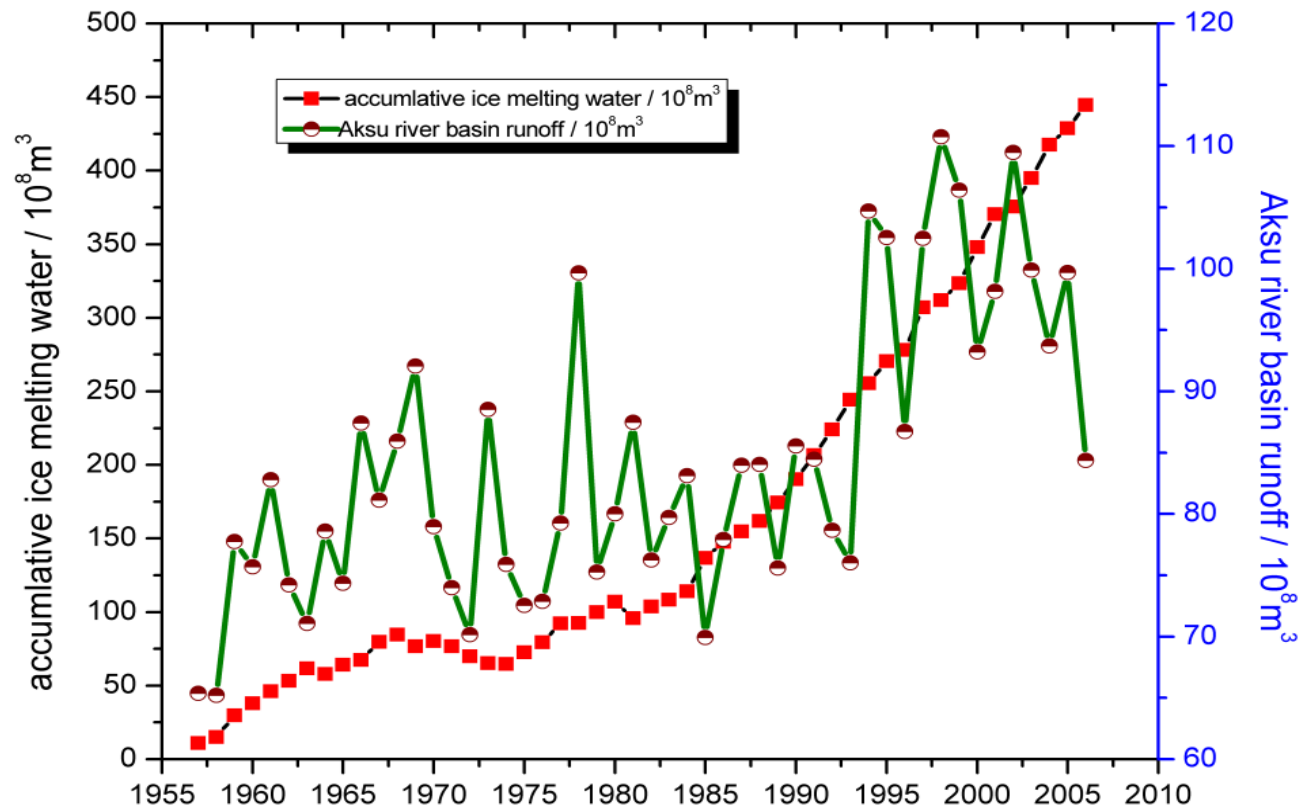
SuMaRiO - funded by the Federal Ministry of Education and Research (BMBF) of Germany





Source: Shen Yongping

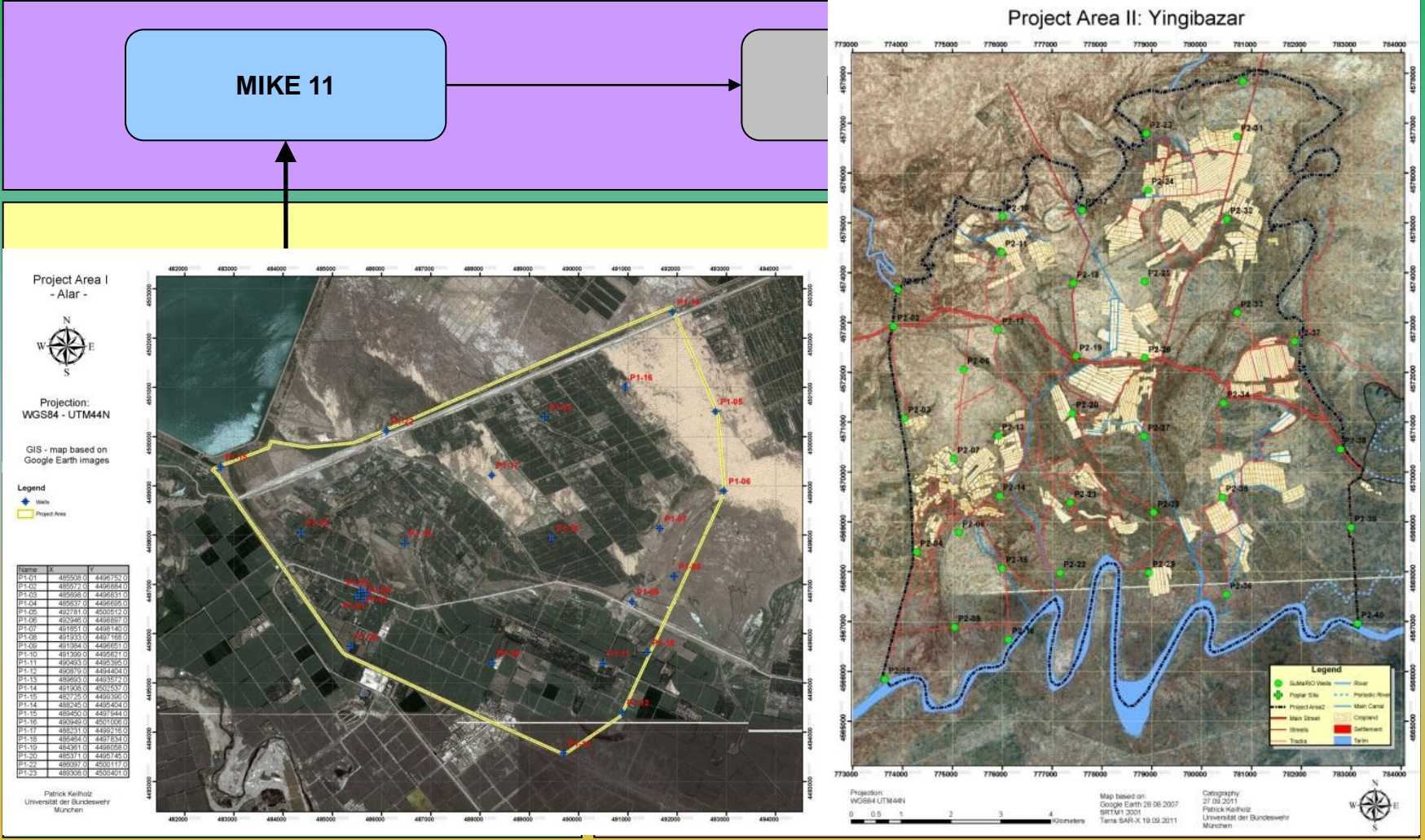
Cold and Arid Regions Environmental and Engineering Research Institute,
Chinese Academy of Sciences, Lanzhou



Aksu River Basin

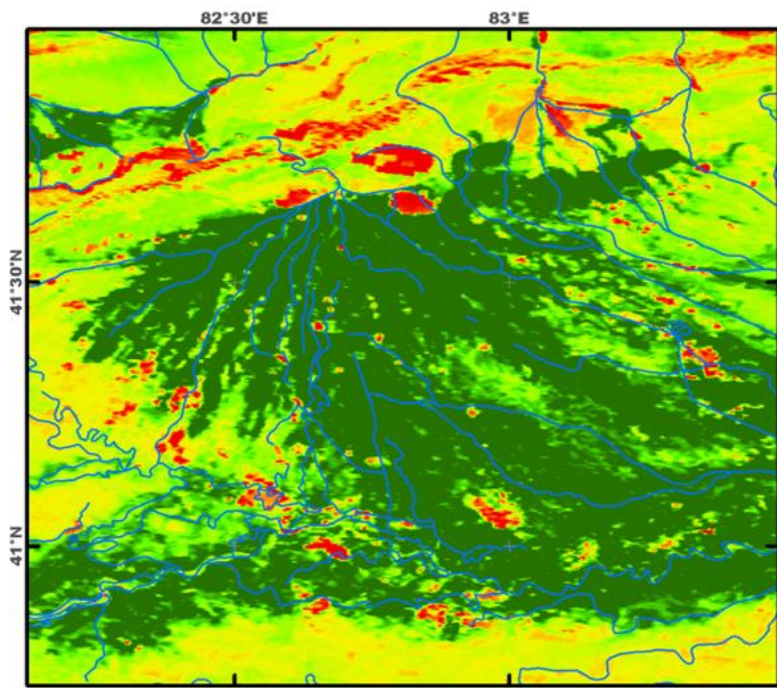


Setup for Hydrological / Hydraulic Modeling

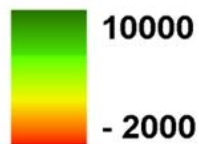


Markus Disse, Patrick Keilholz, Lina Klinuicinaite, Universität der Bundeswehr München, Water Management and Resources Engineering, Germany

Earth Observation Satellite Imagery (Landsat, ASTER, RapidEye) to provide local to regional mapping products on agricultural land use systems.



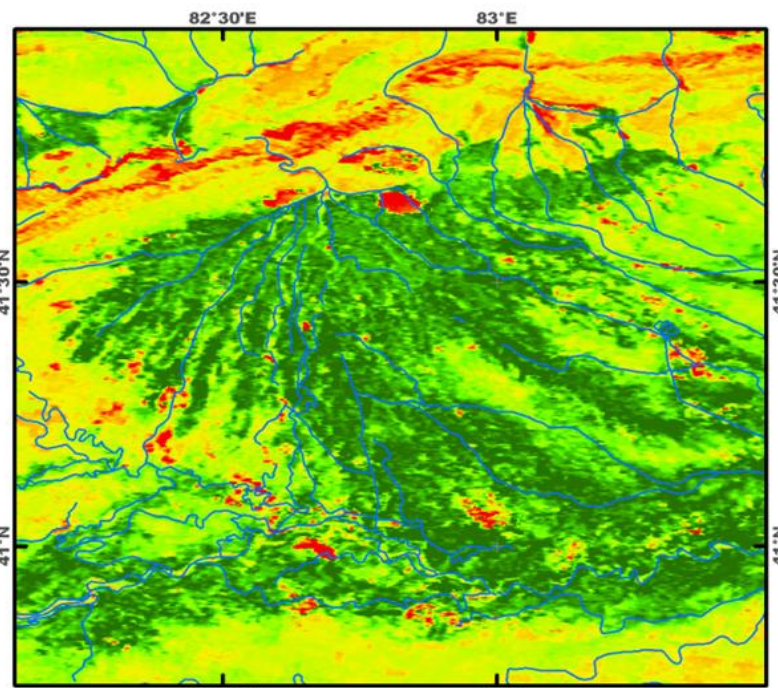
NDVI 0 20 40 Kilometers



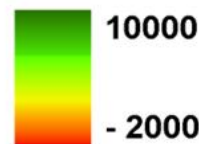
— Rivers

Data source:
MODIS MOD13Q1 LCP V5
18. February 2008

Projection:
Geographic Lat/Long
WGS84



EVI 0 20 40 Kilometers



— Rivers

Data source:
MODIS MOD13Q1 LCP V5
18. February 2008

Projection:
Geographic Lat/Long
WGS84



Prof. J. Hill,
Environmental
Remote
Sensing &
Geoinformatics
Trier University,
Germany

Tugai Vegetation

Riparian Vegetation (water supply mainly by ground water, similar to Cottonwoods in Southwest of USA)

Tugai Forests, consisting of *Populus euphratica* and *P. pruinosa*



Phragmites australis



Apocynum pictum



Tamarix species

Source: Niels Thevs, University of Greifswald

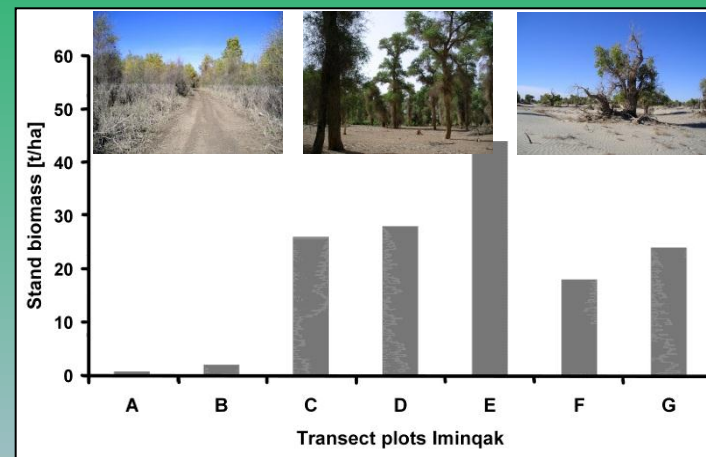
ESS of Tugai Vegetation – examples



Apocynum pictum yields fibres for textiles (groundwater level up to 5 m).



Reed serves as raw material for paper and construction material.



Stand biomass [t/ha] of Tugai forests. Thevs et al. (2011).



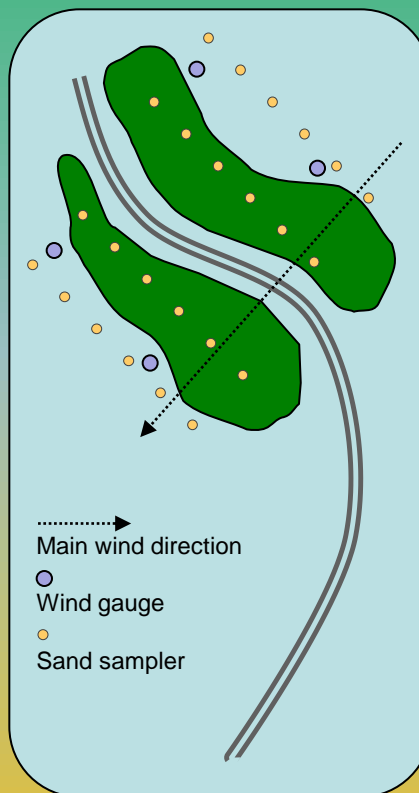
Carbon storage in Nebkha dunes under *Tamarix*

ESS: Protection from wind-blown sand

(Bernd Cyffka, Applied Physical Geography, Catholic University of Eichstaett-Ingolstadt)



Calculation of protection capacity



Elaboration of management plans

The Solution: Participatory Processes: Stakeholders, Scientists & Decision-Makers

Science Based
Planning and
Decision-Making

Social Learning
Sustainability
Learning



More Inclusive
and Integrative
Solutions

Source: SAHRA,
University of Arizona, Tucson

The next steps (2012 – 2015)

- I. Accomplish the hydrological model
 - backbone for sustainable water and land management
- II. Couple hydrological, ecological and socio-economic models
 - Decision support system
- III. Strengthen the inter- and transdisciplinary research
 - Implementation of a sustainable management plan

Thank you for your attention!

SuMaRiO - Partners



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