Solutions & Planning Tools for Sustainable Water Supply in Prosperous Regions with Water Shortage

Christian D. León
Verbundkoordinator

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Universität Stuttgart · KIT Karlsruher Institut für Technologie · TZW Technologiezentrum Wasser · disy · OTT · decon international · Ingenieurbüro Pabsch & Partner · ipp · Federal Ministry of Education and Research · GRoW Water as a global resource

Project title & partners

TRUST - Sustainable, fair and environmentally sound drinking water supply for prosperous regions with water shortage:

Developing solutions and planning tools for achieving the Sustainable Development Goals using the river catchments of the region Lima/Peru as an example

Universität Stuttgart	Center for Interdisciplinary Risk and Innovation Studies - ZIRIUS Institute for Sanitary Engineering, Water Quality and Solid Waste Management - ISWA
KIT Karlsruher Institut für Technologie	Institute for Water and River Basin Management - IWG Institute of Photogrammetry and Remote Sensing - IPF
TZW Technologiezentrum Wasser	TZW: DVGW-Technologiezentrum Wasser (Karlsruhe)
disy	Disy Informationssysteme GmbH (Karlsruhe)
decon international	decon international GmbH (Bad Homburg)
OTT	OTT Hydromet GmbH (Kempten)
ipp	Ingenieurbüro Pabsch & Partner Ingenieurgesellschaft mbH (Hildesheim)

Strategic partners in Peru

sedapal

ANA
Autoridad Nacional del Agua

Sunass
El regulador del agua potable

Senamhi
SERVICIO NACIONAL DE METEOROLOGÍA E HIDROLOGÍA DEL PERÚ

aquafondo
INVERSIÓN EN AGUA PARA LIMA

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OBSERVATORIO DEL AGUA
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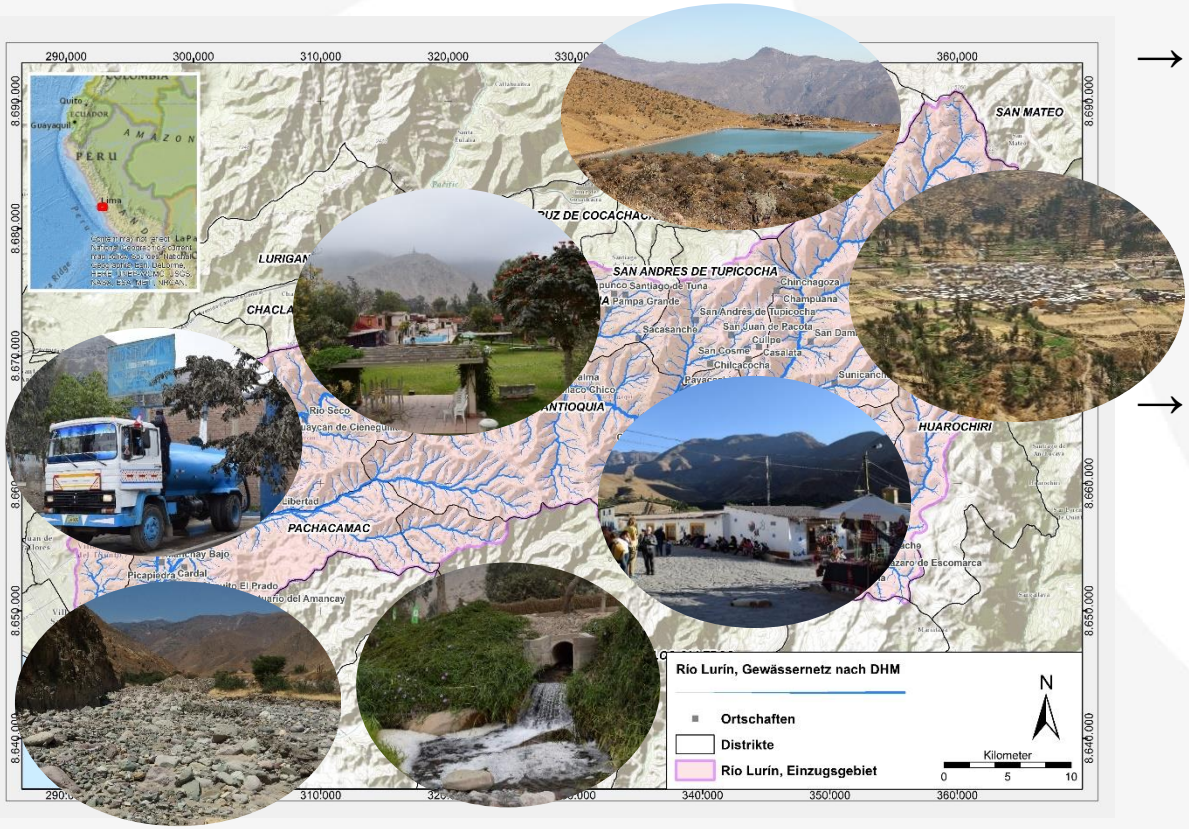
How to achieve SDG 6 in prosperous regions of the world?

Lima/Peru

- → economic growth region
- → high population growth
- → increasing water demand
- → competing water users: industry, agriculture, tourism, households
- → unequal access to safe drinking water and sanitation services
- → water scarcity
- → river discharge: strong seasonality
- → overexploitation of groundwater
- → incomplete monitoring network
- → complex governance structure

Catchment areas in prosperous regions tackling water scarcity

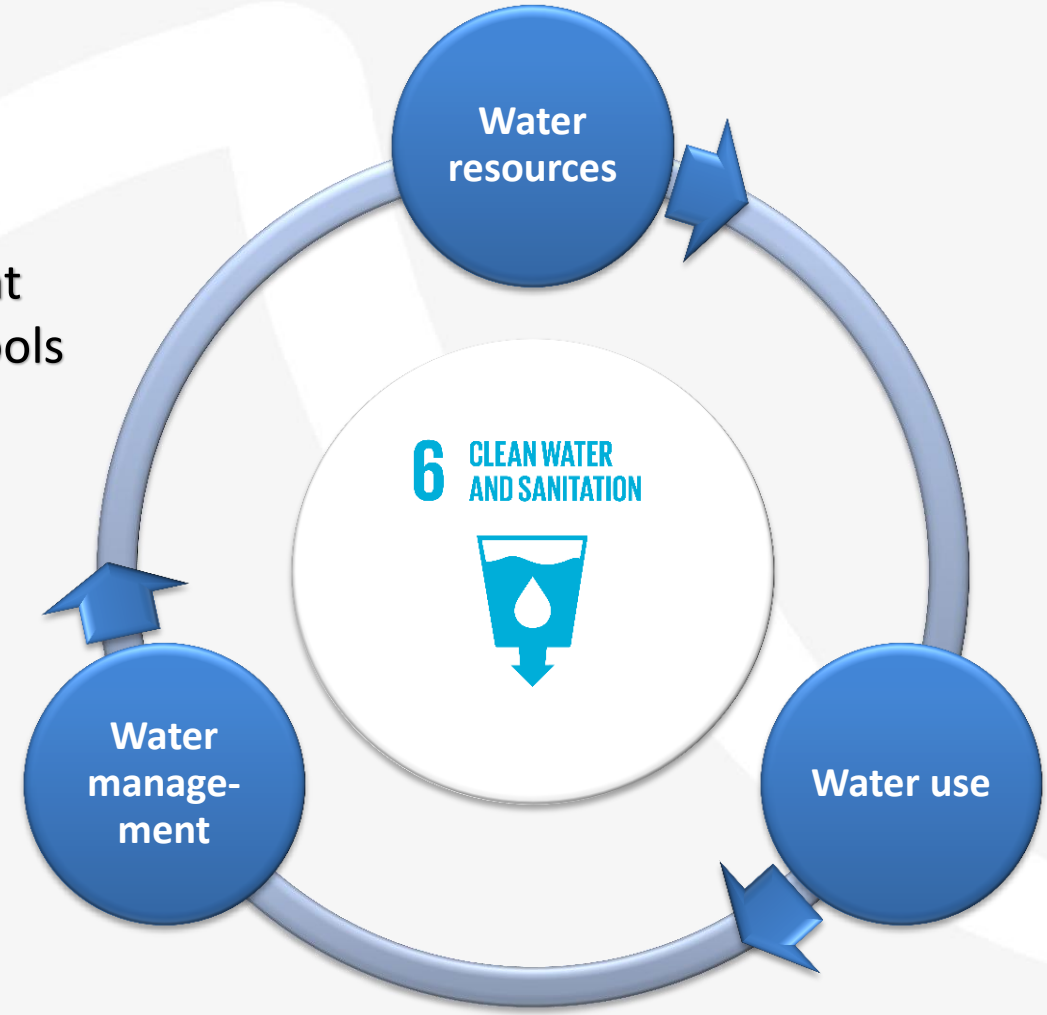
Case study: **Rio Lurin watershed**, Lima/Peru (area: 1670 km²)



Cartography: TZW, Data source DHM: TanDEM-X / DLR

- → Lurin, upper part:
  - → rural-urban migration
  - → traditional agriculture
  - → rainy season < 5 months
  - → water storage (reservoirs)
- → Lurin, lower part:
  - → high population growth
  - → increasing industrial activities
  - → urbanization vs. green areas
  - → nearly zero precipitation

Interdisciplinary approach

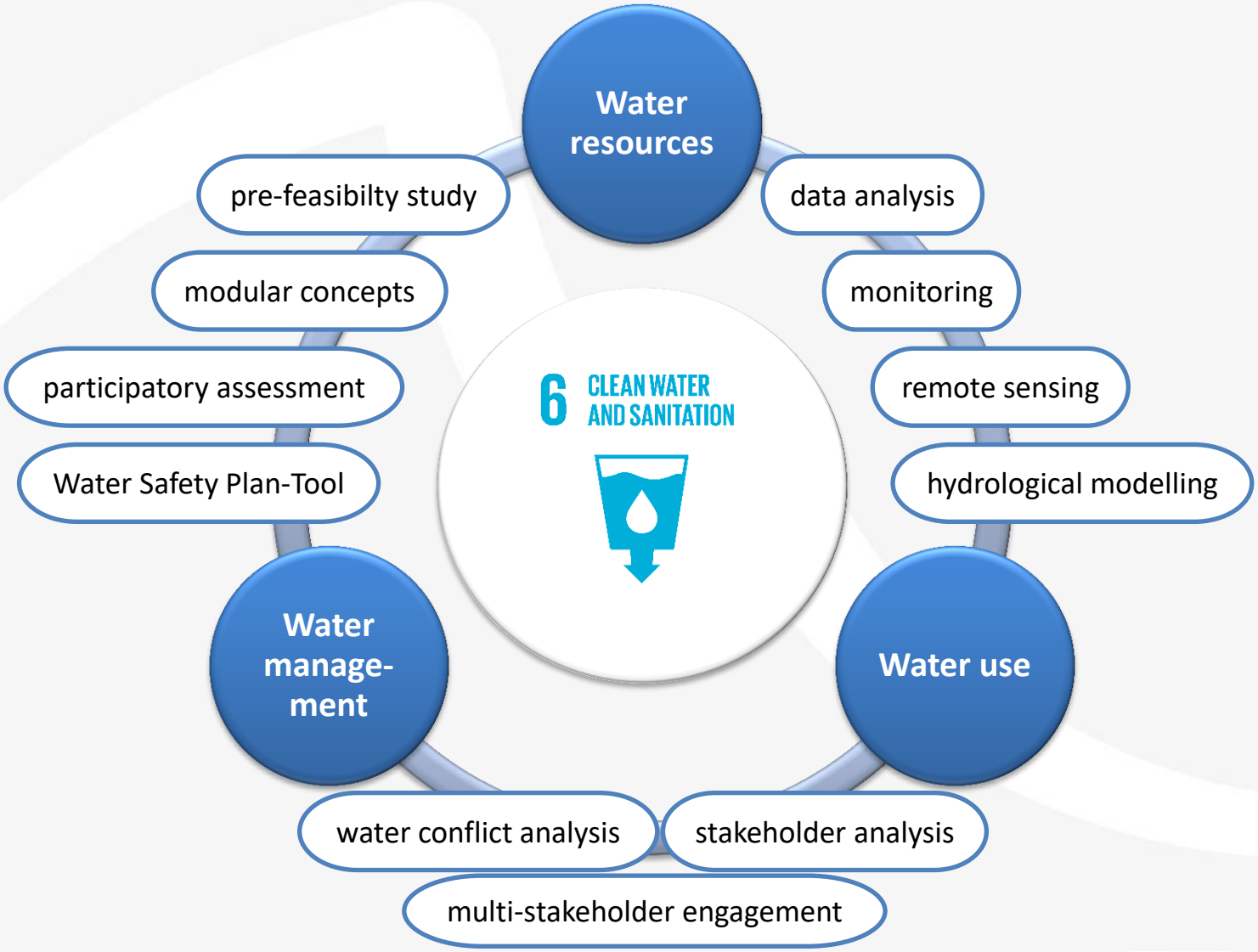


management concepts & tools

monitoring & modelling

stakeholder & conflict analysis

Activities, research topics & products



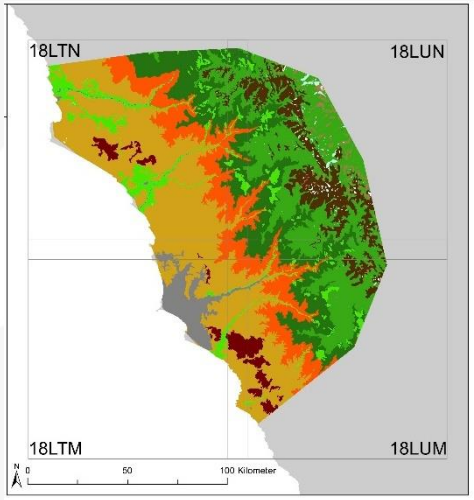
Case study & test site

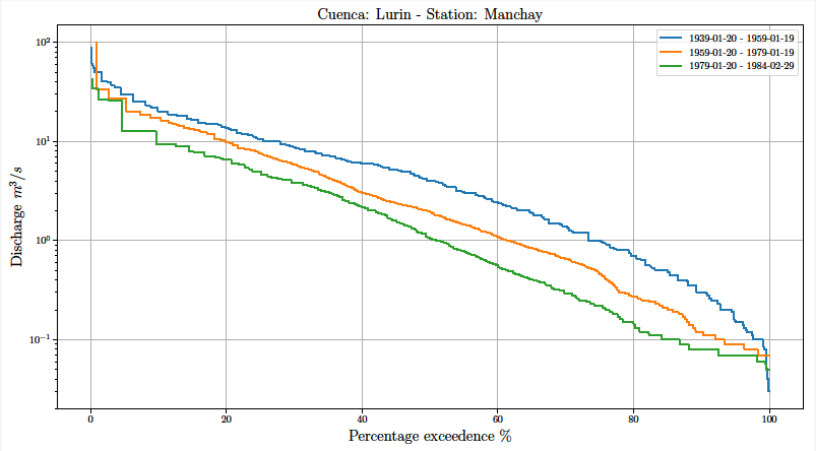
- Rio Lurin watershed (Lima, Peru)

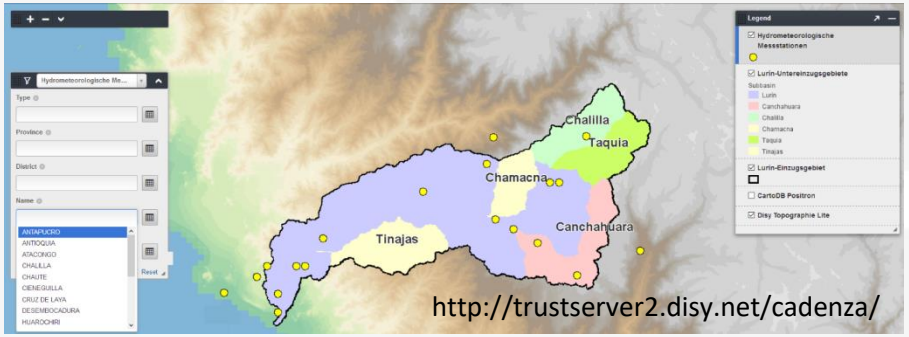
- Klingenberg reservoir (Saxony, Germany)

Results: monitoring & modelling

- combining terrestrial observations, remote sensing data, hydrological modelling
- installation of rain gauges, water level gauges, meteo stations
- hyperspectral camera, EnMAP satellite mission to characterize water hygiene and land use
- data management repository (GIS portal)

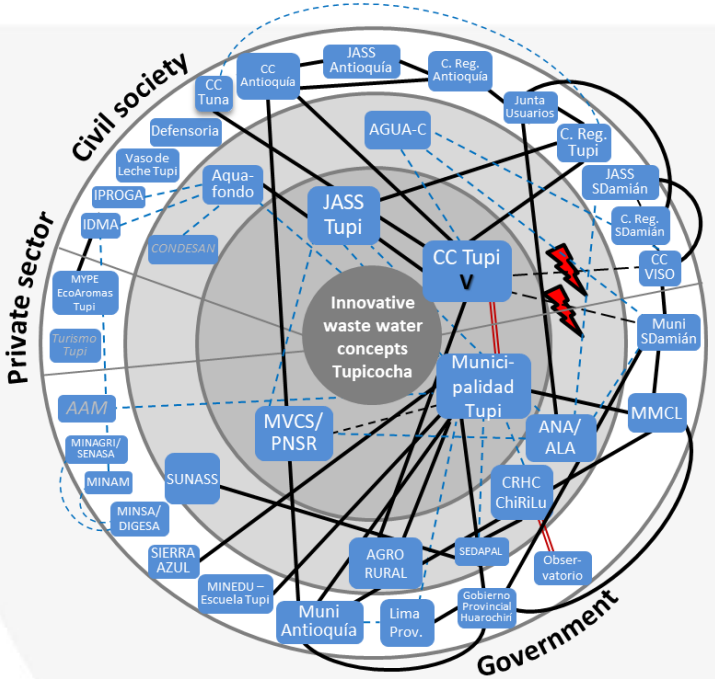






Results: stakeholder & conflict analysis

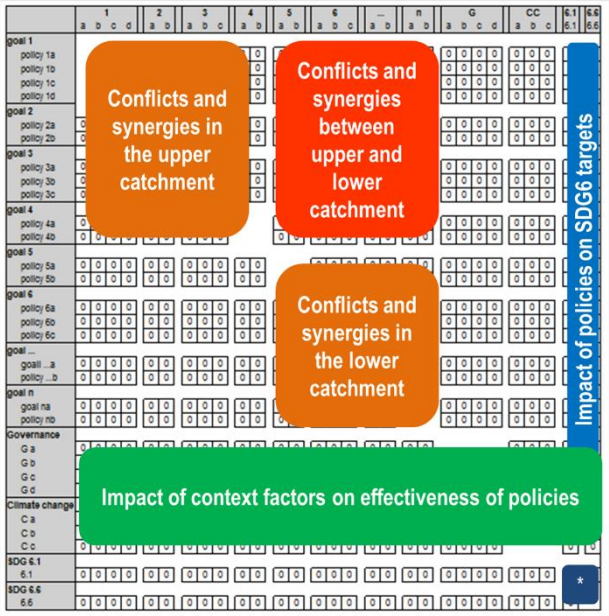
- stakeholder analysis (roles, relationships, goals) based on interviews and online research
- identification of actors for participatory processes
- stakeholder dialogues
- community-based assessment of alternative drinking water and waste water concepts
- methodology for analysis of water conflicts



Conflict analysis using Cross-Impact Balances (CIB)

- Lurin (latent) conflicts: upper vs. lower catchment, **between goals & between policies/measures** of different users (agriculture, industry, tourism, households)
- objective: identify **conflict free policy mixes** for the entire catchment, to fulfill water related goals of different users
- methodology: qualitative, semi-formalized form of systems analysis: **Cross-Impact Balance analysis CIB** (Weimer-Jehle 2006)

Cross-impact matrix (stylized)



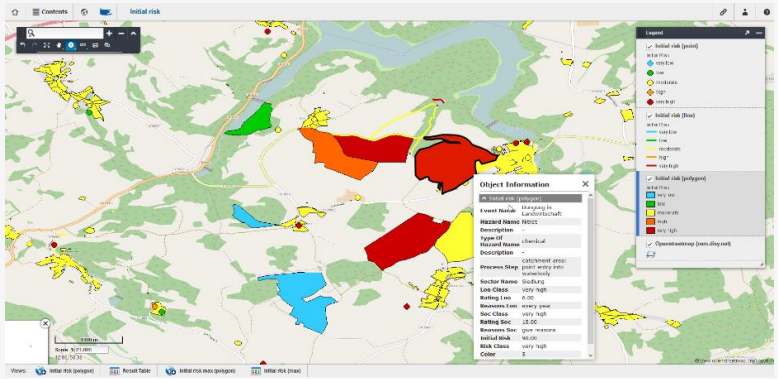
*= interrelations between SDG targets

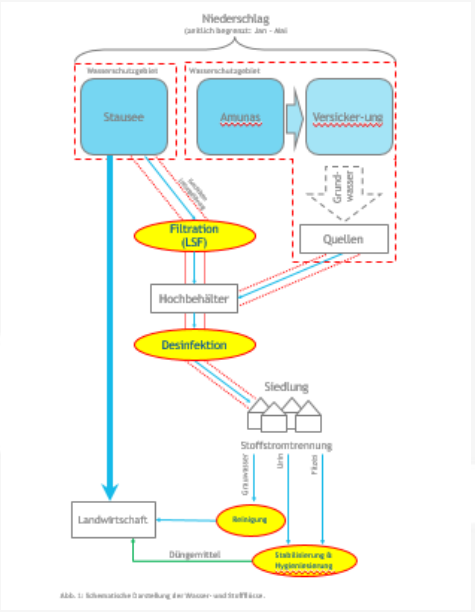
→ see poster!

1. Identify **central goals** of different water users
2. Define **alternative policies** to reach these goals
3. Assess **impacts** between policies (pairwise)
4. Identify conflict free **policy mixes** (multi-goal optimization)
5. Assess **feasibility** (multi-stakeholder dialogue)

Results: management tools & concept modules

- analysis of local water cycles
- integrated concepts for water supply and waste water treatment, incl. water efficiency and reuse
- adapted to different scales (upper, middle, lower catchment; rural, semi-rural, urban areas)
- capacity building on management of WWTP for local partners
- demonstration plant testing
- decision-support-tool based on WSP





Outlook

- capacity building for local partners (e.g. Expoagua 2019)
- hydrological model: scenario-based analysis of water management measures
- conflict analysis: identify conflict-free policy mixes to achieve water-related goals on different levels
- multi-stakeholder dialogue: discuss policy options
- findings on combination of terrestrial observations, remote sensing techniques, hydrological modelling
- SDG contribution of water supply and wastewater management schemes
- implementation & pilot: pre-feasibility study for water supply & wastewater treatment concept in San Andrés de Tupicocha
- transfer of TRUST-products (manuals, WSP-tool)
- challenge: coordination with local actors, weak governance & authority to implement integrated solutions

Muchas gracias!

Christian D. León

E-Mail christian.leon@zirius.uni-stuttgart.de

Phone +49 (0) 711 685-83974

Web www.trust-grow.de

University of Stuttgart

Center for Interdisciplinary Risk and Innovation Studies

Seidenstr. 36, D-70174 Stuttgart

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