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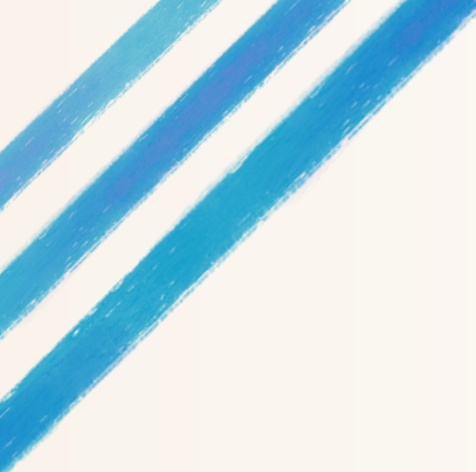
TRANSCEND

POLICY BRIEFS

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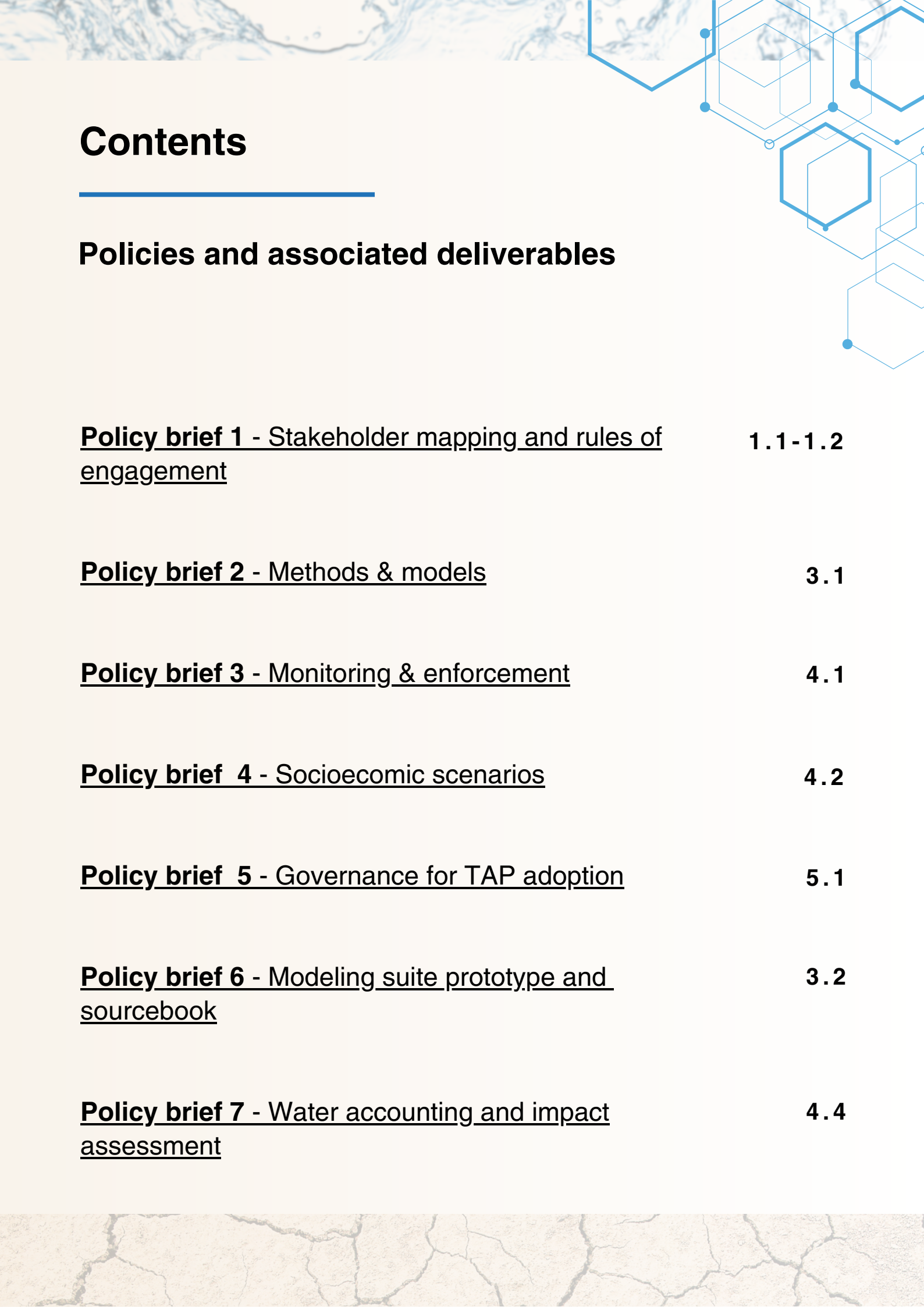


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POLICY BRIEF 1 - STAKEHOLDER MAPPING AND RULES OF ENGAGEMENT

Stakeholder mapping by project laboratories and rules of engagement

Stakeholder engagement is instrumental to the successful implementation of transformative water reforms. Considering water as a precious and limited resource, its efficient management necessitates active cooperation and coordination among a range of stakeholders, comprising government entities, civil society organisations, water consumers and the private sector.

The TRANSCEND partnership is committed to involving these stakeholders in a meaningful way to ensure the research reflects their needs and perspectives and to build an interactive environment wherein stakeholders actively contribute to the creation of models and action plans, thereby fostering a sense of co-ownership over the results.

Risks and opportunities related to water, which is a pivotal resource in achieving Sustainable Development Goals, in the last decades have been faced with issues of scarcity, floods, pollution, governance, climate change, drinking water availability, quality and justice.

The TRANSCEND project aims to address these challenges, implementing transformative agendas across seven pilot river basins in various countries and fostering collaboration among different sectors, in order to promote sustainable and resilient water management policies. The river basins (also called living labs) included in the project are: Júcar (Spain), Reno (Italy), Tympaki (Crete, Greece), Nitra (Slovakia), Caplina-Mauri-Desaguadero (Peru, Chile, Bolivia), Orontes (Lebanon, Syria, Turkey) and Mahanadi (Chhattisgarh and Odisha, India).



POLICY BRIEF 1 - STAKEHOLDER MAPPING AND RULES OF ENGAGEMENT

Stakeholder mapping by project laboratories and rules of engagement

Initial stakeholder mapping consists in providing a succinct overview of the water governance arrangements in the countries encompassing the living laboratories, detailing the water organisations operating within these living labs, describing their responsibilities in key aspects of water governance decision-making and further elaborating on the roles, competences, skills, and expertise of these organisations.

Stakeholder mapping enables preliminary insights into the dynamics of water governance systems, helping in the identification of key experts, institutions, communities, and local action groups.

The above process of stakeholder mapping and involvement is defined by the Rules of engagement, a document that describes with what purpose and how various stakeholders will be engaged in this research, as well as how this engagement will be organised, managed and supervised; moreover, it defines the governance bodies and provides guidelines and shared principles that will govern the conduct of all parties involved in the inclusive research process.

The rules of engagement are built on the Talanoa Dialogues, which is a process of inclusive, participatory and transparent dialogue promoted by the United Nations to create and enforce respectful and constructive exchanges throughout the entire co-creation process, fostered by anticipatory dialogues generating trust and pro-environmental behaviour.



POLICY BRIEF 1 - STAKEHOLDER MAPPING AND RULES OF ENGAGEMENT

Stakeholder mapping by project laboratories and rules of engagement

The research will have a rigorous and high-quality standard that adheres to principles of ethics and research integrity outlined in the EU Horizon Europe Research and Innovation program. This includes obtaining informed consent from participants, protecting their confidentiality and privacy, and being transparent about research methods and findings. Inclusive dialogue, storytelling and serious games will be used to facilitate negotiations among stakeholders with different levels of empowerment and resources.

The project also prioritises compliance with relevant laws and regulations and responsible handling of data. The governance structure includes the roles and responsibilities of the project team and the designated oversight bodies. It also covers operational management of the networks, including key strategies and best practices. Rules of engagement also describe data management aspects, intellectual property rights and communication strategy of the project as far as these aspects directly affect knowledge networks.

The rules of engagement will be rigorously enforced to create a collaborative and inclusive research atmosphere through feedback mechanisms, enabling stakeholders to express concerns or propose enhancements. This ongoing communication will support the adjustment and improvement of the rules of engagement as needed, guaranteeing their efficacy and pertinence throughout the project's duration.

POLICY BRIEF 2 - METHODS & MODELS

Methods & models for assessing policy performance under deep uncertainty

Uncertainty and, in particular, its quantification and management, is a key point in the process of adaptation to climate change and one of the most important pillars of the TRANSCEND project.

Therefore, a systematic literature review is necessary in order to assess the quantification of uncertainty that characterises Socio-Ecological System (SES) models for water resources management and water stress mitigation (water stress is a more inclusive, a broader concept, compared with shortage and scarcity, related to the ability to meet both human and ecological demand for water).

As a result of the review, an analysis on whether and how SES modelling of water resources assess and quantify different sources of uncertainty, including input, parameter, structural and contextual uncertainty, was made. It emerged that while most studies consider and to some extent quantify uncertainty (156 out of 198 studies in the sample), the depth and detail of this assessment is far from comprehensive and largely focuses on partial analyses of input uncertainties.

The literature review enabled the design of pathways towards more systematically integrating uncertainty into SES modelling of water resources, as well as the conception of seven recommendations to mainstream uncertainty quantification into SES modelling of water resources, and potentially into decision-making processes informed by Decision Support Systems. It also led to the acknowledgment of the potential limitations of uncertainty quantification and the proposition of strategies to account for them.



POLICY BRIEF 2 - METHODS & MODELS

Methods & models for assessing policy performance under deep uncertainty

Finally, it enabled to illustrate how a SES model of water resources that accounts for the seven recommendations mentioned above may look like.

To this purpose, TRANSCEND is based on an integrated approach, which envisages the participation of hydrologists, economists, agronomists, stakeholders and other scientists with an interest in SES modelling of water resources;

these experts give an essential contribution to the discussion on how to quantify and assess modelling uncertainties, as well as to understand how best to communicate them to decision makers so that future policies account for unfavourable contingencies and plan strategies to address them.

POLICY BRIEF 3 - MONITORING & ENFORCEMENT

Monitoring & enforcement

Reliable and effective monitoring of water use, water quality and water availability is essential for the design and implementation of sustainable, equitable and efficient water management policies.

Particularly, in recent decades, pressure on water resources has increased due to climate change, population growth and socio-economic development. Unfortunately, in almost every area around the world, large gaps exist in infrastructure and capacity to monitor natural and human components of the water cycle, including hydraulic waterworks and integrated water services.

The causes and consequences of water monitoring gaps are discussed and reviewed in the TRANSCEND project. Deficiencies and gaps in the monitoring of water usage and availability arise for a variety of technical, socio-economic and political reasons, like chronic underfunding of monitoring infrastructures and agencies by governments and direct opposition or attempts to circumvent data collection by water users.

Resulting gaps in knowledge about water usage and availability increase the likelihood that water will be used or allocated in ways that are unsustainable and inefficient, with the burden of water risks resulting from poor water management often falling disproportionately on the environment and marginalised user groups, generating potential conflicts.



POLICY BRIEF 3 - MONITORING & ENFORCEMENT

Monitoring & enforcement

To address these challenges, it is claimed that there is a fundamental need for governments, donors, and water managers to drastically increase the prioritisation – and financial investment – committed to both collecting water data and enforcing policies around water uses and water benefits (ecosystem services).

Agencies responsible for monitoring water use and availability must also explore and develop the capacity to exploit new approaches to strengthen monitoring within their constrained budgets and capacity, making use of digital technologies such as satellite remote sensing and Internet of Things (IoT), citizen involvement in water data collection and management and partnerships with the private sector.

Finally, there is a need for recognition that perfect monitoring will never be feasible or practical in the real world, and, as such, policy design should seek to explicitly embed and consider uncertainties in our ability to monitor water use and availability. This must include efforts to incentivise compliance with water use regulations by users, in particular in the agricultural sector, through a combination of rewards and penalties that are grounded in an improved understanding of water user compliance behaviour.

Only with these innovations will technical advances in water management plans and policies be likely to succeed in their objectives, and societies be able to address growing water risks in the years to come.

POLICY BRIEF 4 - SOCIOECONOMIC SCENARIOS

Socioeconomic scenarios by lab

The TRANSCEND project seeks to establish a comprehensive Socio-Ecological Systems (SES) modelling suite, empowering stakeholders to explore, assess and navigate trade-offs among various Transformational Adaptation Policies (TAPs).

These models play a crucial role in simulating the intricate connections and feedback loops between human societies and the natural environment. Specific to TRANSCEND, SES models provide for a comprehensive understanding of the complexities surrounding climate change adaptation strategies, equipping governments, policymakers, stakeholders and communities with valuable insights to develop effective adaptation plans.

SES models enable the simulation of different interventions, such as climate-resilient water resources management, sustainable agriculture and land-use practices and regulations and nature-based adaptation approaches.

To explore and comprehend future climate and socioeconomic conditions, two essential sets of emission scenarios are widely employed: Representative Concentration Pathways (RCPs) and Shared Socioeconomic Pathways (SSPs). These scenarios serve as indispensable tools to assess potential trajectories of greenhouse gas emissions, climate change and socioeconomic development. Integrating SSP-RCPs with SES models, however, poses challenges due to issues of scale, uncertainty and feedbacks to the large-scale climate system.



POLICY BRIEF 4 - SOCIOECONOMIC SCENARIOS

Socioeconomic scenarios by lab

This white paper aims to highlight the opportunities and challenges associated with employing SES models in conjunction with SSP-RCPs, fostering a deeper understanding of the intricate interactions between human societies, ecosystems and the global climate system. To best utilise climate projections data, specific recommendations for each lab are presented, considering the current state of the model systems in each lab.

Each of the 7 TRANSCEND labs appears to have made substantial progress in its model systems, already addressing climate change impacts and implications for sustainable development, environmental management and climate change adaptation. In some cases, refining the modelling framework and the data used to force the models may be necessary to better assess these impacts.

Integrating socioeconomic data consistent with climate change projections is also critical and should be done. Additionally, considering Global Warming Levels can inform society and policymakers about the implications of complying with the Paris Agreement.

A round of workshops is already planned to address these crucial aspects, ensuring a more comprehensive approach to climate change adaptation and policy formulation.



POLICY BRIEF 5 - GOVERNANCE FOR TAP ADOPTION

Governance, policy and financial mechanisms for TAP adoption and upscaling

This work conducts a desk literature survey, complemented with deep dive case studies involving experts and key stakeholders from 7 international basins representative of different socioeconomic and biophysical contexts, to document the barriers (and opportunities) for Transformational Adaptation Policies (TAP) adoption.

Application of inductive methods is made to identify common candidate theories across case studies, that explain the emergence and persistence of barriers in TAP adoption while identifying enablers that may help overcome these barriers.

The ways in which key players in the water policy arena (including water users, regional communities, decision-makers, regulators, water works suppliers, donors and integrated water cycle managers) may contribute to creating barriers to TAP adoption are assessed; and how this network of players and their interactions condition the relevance and strength of these barriers.

Leveraging this information, the following is proposed: a series of common principles and guidelines centered around regulations, institutions and policy, incentives, information and debiasing.

These tools will be helpful for guiding the adoption of TAPs that contribute to sustainable and equitable economic development and welfare growth, even under conditions of uncertainty.

POLICY BRIEF 6 - MODELING SUITE PROTOTYPE AND SOURCEBOOK

Modeling suite prototype and sourcebook

The process of assembling, calibrating, and validating an actionable modeling suite for each living lab involves key principles: uncertainty quantification and a protocol-based modular approach, along with the key methods available in the literature.

Since the sources of uncertainty are commonly categorized into input, parameter, and structural uncertainty, TRANSCEND plans to address these uncertainties through the following quantification approaches. Input uncertainty is quantified using scenario-based approaches for all labs and most systems. Parameter uncertainty is quantified using local sensitivity analysis for the Júcar lab and global sensitivity analysis for the other labs, implemented in the economic and hydrological modules. Finally, structural uncertainty is quantified using multi-model ensemble diversified approaches for each living lab.

The uncertainty quantification methods are combined with a protocol-based modular approach. Modularity means that models at each system level in the suite are to be i) run independently, and ii) connected through sets of bidirectional protocols. These are rules to manage interrelationships among systems' modules, i.e. two-way feedback.

To this end, each module needs to be populated with multiple models of climatic, hydrologic, agricultural, microeconomic and macroeconomic data as well as models of other relevant systems identified during co-development, to quantify structural uncertainties.

The modeling suite in each living lab will be parameterized, calibrated and validated leveraging data provided by the water accounting and monitoring toolbox developed within other project tasks and activities that will also, where possible, help reduce uncertainty by incorporating more accurate data inputs.

POLICY BRIEF 7 - WATER ACCOUNTING AND IMPACT ASSESSMENT

Water accounting and impact assessment

Water monitoring is critical for planning and policy, especially under climate and socio-economic change. Detailed information on the spatial distribution, quantity and variability of human and natural components of the hydrologic system is needed for informed decision-making around allocation and management of scarce water resources, both at the local level – such as farm-level irrigation scheduling – and for crafting basin-to-national-scale policies and long-term strategic planning.

Monitoring of water demand and supply is therefore central to the TRANSCEND project's aim of identifying, designing, and catalysing the adoption of Transformational Adaptation Policies (TAPs) to water scarcity. Despite these needs, gaps in basin-scale monitoring impede our ability to design and implement TAPs.

Monitoring data gaps have serious implications for the sustainability and effectiveness of water management, constraining efforts to allocate available water resources between competing uses, limiting the ability to effectively identify and assess environmental impacts of policy changes, and reducing overall trust in water management planning.

There is a pressing global need to develop affordable, transferable and accurate methods to collect policy-ready water availability data. Through a set of research activities and a decision-making process including co-creation, TRANSCEND has developed a Monitoring Toolbox.

POLICY BRIEF 7 - WATER ACCOUNTING AND IMPACT ASSESSMENT

Water accounting and impact assessment

At its core is the development of land use/land cover and irrigated area maps using Earth Observation (EO) data. EO data, combined with advanced data-driven modelling tools such as machine learning algorithms, provides a scalable and cost-effective solution to address gaps in agricultural land and water use monitoring that were identified as a common cross-cutting monitoring need across the majority of TRANSCEND's living labs and are of broader importance globally in water-scarce river basins.

The key features of the Toolbox, along with specific activities and timelines for a series of pilot applications have been planned in four of TRANSCEND's living labs spanning three continents and six countries: Titicaca Lake, Desaguadero River, Lake Poopo system in Latin America (Bolivia, Peru, Chile); Jucar River basin in Spain; Mahanadi River basin in India; and the Tympaki River basin in Greece.

The monitoring process is equipped with processes for ensuring that the Toolbox and the data it produces are impactful, actionable, and sustainable beyond the end of TRANSCEND, both within the pilot labs and in river basins globally. These include stakeholder engagement and partnership in co-design, open-access code/tools, and synergetic knowledge exchange, both within and beyond the consortium.

In doing so, the TRANSCEND Monitoring Toolbox will be a vital vehicle supporting the development of TAPs to water scarcity, climate change, and socio-economic development in agriculturally intensive river basins worldwide.



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