TRANSCEND

Deliverable 7.1: INCEPTION REPORT AND ROADMAP

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☐ CI = Classified, information as referred to in Commission Decision 2001/844/EC.

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Executive summary

The Inception Report (IR) and Roadmap: 1) flesh out the research pillars underpinning the TRANSCEND Project; 2) present the consolidated organizational structure and decision making of the project, including the composition and roles of the Coordinator, Project Steering Committee (SC), Management Board (MB), and External Advisory Board (EAB); 3) specify the roles and responsibilities of each partner within each work package and task, and clearly establish the person and institution responsible for the timely completion and delivery of milestones and deliverables that meet the high quality standards set by the TRANSCEND Consortium. All these aspects were thoroughly addressed and agreed upon during the Grant Agreement and Consortium Agreement signature stages, and developed further in exchanges among partners that have taken place since, particularly during the first General Assembly of the Consortium (kick-off meeting) organized in Salamanca (15-16 February). The IR and Roadmap also present decisions taken during the kick-off meeting and substantiate the contingency plan sketched in the Grant Agreement, providing additional details of the contingency actions including those already implemented. The IR and Roadmap have been revised and agreed by all Consortium partners.

Contents

1. Consortium

The TRANSCEND Consortium comprises 15 outstanding research organizations (Table 1) with excellent and complementary expertise and skills that support the pillars of the project, namely: 1) initiation and management of *knowledge networks* for stakeholder engagement and knowledge sharing, 2) *actionable modeling* that integrates interdisciplinary socio-ecological science and ensemble forecasting to guide the design of transformational adaptation policies (TAP), and 3) *water accounting and monitoring* to support implementation and enforcement of TAP in practice. TRANSCEND partners also have relevant expertise working in the **7 living labs** of the project, namely: Júcar River Basin (RB) (Spain); Reno RB (Italy); Tympaki RB (Crete, Greece); Nitra RB (Slovakia); Caplina-Mauri-Desaguadero System (Peru, Chile and Bolivia); Orontes RB (Lebanon, Syria and Turkey); and Mahanadi RB (Indian states of Chhattisgarh and Odisha). Partners have been involved in, or coordinated, some **25** H2020 actions under the Societal Challenge 5 (Climate Action, Environment, Resource Efficiency and Raw Materials), for a total value of 245 million Euro (Cordis open data January 2022), thus having the necessary in-house management expertise to successfully implement the action. A detailed description of the expertise and skills each partner brings to the Consortium is available in Annex I.

Table 1: Consortium partners

Participant No.	Participant organization name	Country
1 **USAL** (Coordinator)	Universidad de Salamanca	Spain
2 **CMCC**	Centro Euro-Mediterraneo sui Cambiamenti Climatici	Italy
3 **UU**	Uppsala Universitet	Sweden
4 **FTC**	Fresh Thoughts Consulting	Austria
5 **UPV**	Universitat Politècnica de València	Spain
6 **SEI**	Stockholm Environment Institute	Sweden
7 **UoM**	University of Manchester	UK
8 **ARPAE**	Agenzia regionale per la prevenzione, l'ambiente e l'energia dell´Emilia-Romagna	Italy
9 **SAŽP**	Slovak Environment Agency	Slovakia
10 **SEVEN**	Solutions for the Environment and Engineering	Greece
11 **AUB**	American University of Beirut	Lebanon
12 **KRI**	Region of Crete	Greece
13 **SVP**	Slovak Water Management Enterprise	Slovakia
14 **IRAP**	Institute for Resource Analysis and Policy	India
15 **ASU**	Arizona State University	US

2. Objectives

The objective of TRANSCEND is to identify and catalyze the adoption of robust TAP that achieve equitable and sustainable economic and welfare growth. This main objective is built upon **six specific objectives (SO)** that are *measurable, verifiable and achievable*:

- **SO 01 - Inform:** Analyze models, scenarios and metrics currently used by key stakeholders engaged in water resources management under climate change, and enhance the integration of these models and methods with cutting-edge socio-ecological research and ensemble forecasting, to generate actionable science that informs transformational and robust adaptation towards equitable and sustainable growth [*Measure of verification—MoV: adoption of TRANSCEND modeling suite in 7 living labs*]
- **SO 02 - Demonstrate:** Design and demonstrate institutional and technical feasibility and performance of a transition towards sustainable and equitable economic and welfare growth in water-scarce areas under deep uncertainty [*MoV: transition feasibility and performance demonstrated under different natural and cultural environments in 7 labs*].
- **SO 03 - Transform:** Design, test, and inform the adoption of robust TAP to water scarcity under deep uncertainty, harnessing water allocation systems, economic instruments, digital technologies, non-conventional water resources, nature-based solutions, and resilience instruments *[MoV: 10+ TAP designed and tested per lab and 1 TAP adopted per lab]*.
- **SO 04 - Finance**: Develop multi-sector and multi-stakeholder partnerships that create and operationalize novel financing mechanisms to secure sustainable investment into, and cost recovery of, TAP, including investments to update TAP in face of changes, taking into consideration national and EU financing mechanisms *[MoV: achieve sustained funding and resources to maintain and update TRANSCEND ecosystem of innovation and TAP in 5+ living labs]*.
- **SO 05 - Institute**: Replicate adoption of the ecosystem of innovation by establishing during the project's lifetime "inspiration" labs across the world that explore robust TAP adoption *[MoV: establish 8+ "inspiration" labs that initiate development of TRANSCEND ecosystem of innovation]*.
- **SO-06 - Upscale**: Synthesize and upscale the results obtained in the targeted labs to inform national and international strategies for water resources management, climate adaptation, disaster risk reduction, sustainable development, and ecosystem protection in the EU and beyond *[MoV: mainstream project results and methods in 7+ key national strategies and 4+ EU strategies (including Adaptation to Climate Change, Biodiversity, Farm to Fork and Common Implementation strategies)]*.

3. Ecosystem of innovation and research pillars

TRANSCEND will develop a **groundbreaking ecosystem of innovation** that combines 1) an inclusive and transparent stakeholder engagement and knowledge-sharing method, the *knowledge networks*, 2) an *actionable modeling suite* that integrates interdisciplinary socio-ecological science and ensemble forecasting,

and 3) an *accounting and monitoring toolbox* that supports implementation and enforcement, so as to design, demonstrate and implement robust TAP in seven *'living labs'* that catalyze similar processes elsewhere. Specifically, TRANSCEND will explore synergistic TAP that combine complementary and mutually reinforcing i) economic instruments and ii) water allocation systems; while assessing the interplay between these two and iii) digital technologies (e.g., climate and irrigation services), iv) non-conventional water sources, v) nature-based solutions, and vi) resilience instruments (e.g., insurance).

Below we describe the concepts, models and assumptions that underpin each of the three pillars of TRANSCEND's ecosystem of innovation, the key challenges involved in their adoption and how we will address them, and how implementing the ecosystem of innovation in the labs will contribute to the project's objectives.

3.1. Knowledge networks

The lack of a clear pathway for taking all relevant steps in initiating and managing stakeholder engagement processes jeopardizes innovation and societal transformation (challenge 1). While many stakeholder engagement strategies such as serious games or science-policy dialogues have sprouted over the past few years, it "remains unclear what the extent and modes of participation are in different contexts, and how to select the methods that suit a given situation" (Moallemi et al., 2021). Recently, successful experiences have proposed the adoption of a process-based approach that conceptualizes the stages stakeholders need to go through to successfully initiate and manage engagement in **knowledge networks** (Eikebrokk et al., 2021). These stages include: 1) contextual understanding and relational competence, 2) awareness building, 3) knowledge sharing, 4) rules of engagement and governance, and 5) adaptive efficiency (Eikebrokk et al., 2021; Moallemi et al., 2021). TRANSCEND will follow these five stages to establish a viable knowledge network in each lab that support the co-creation of TAP on the ground. The stages are conceptually represented in Figure 1 and described below.

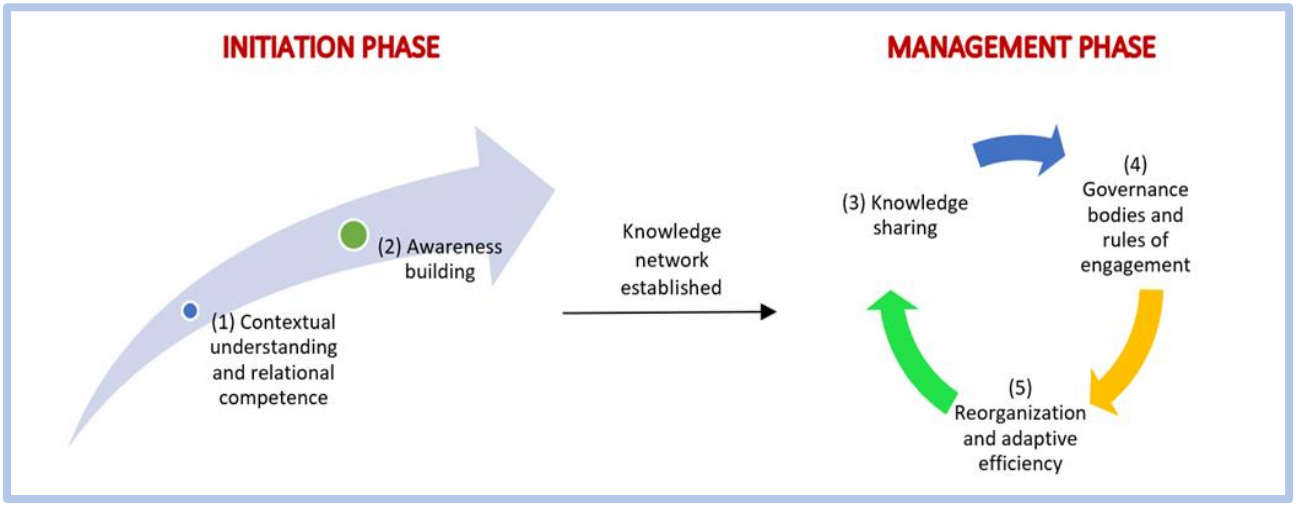

Figure 1. Conceptual framework of the knowledge network

Contextual understanding and relational competence. Developing knowledge networks necessitates in-depth understanding of the context and skills of the network members, so as to ensure that key competences are brought and utilized in co-creation processes. To this end, TRANSCEND will *thoroughly map stakeholders* (including public authorities and regulators, utilities, users, civil society organizations, industry, and scientists), and engage them in knowledge networks that pool complementary knowledge and resources to catalyze synergistic innovations.

Relational competence refers to the complementary knowledge, expertise and skills (or more generally, competences) that enable a mutually beneficial interaction between stakeholders in a network. Relational competence enables reciprocity, multiparty contribution to value creation, as well as shared intentionality—all being key aspects of successful peer-interactions in co-creation processes. Developing relational competence necessitates an adequate understanding of the context and the potential members of a network, as well as their competences, which is often not available due to "network myopia", i.e. the inability to accurately perceive the knowledge network and its potential members. Network myopia and the insufficient development of relational competence have been cited as a limiting factor to TAP comprehension and adoption in complex socio-ecological systems. Critically, developing, understanding and processing accurate data for the assessment of TAP in complex socio-ecological systems requires careful, long-term water resource assessment and monitoring, expertise in river basin dynamics and climate change, rigorous socio-economic analysis, and strong inferential capacity. However, in practice, constraints of time, human, financial and other resources, and the workload of relevant stakeholders, often mean that the complementary competences required to conduct such analysis remain disconnected. Accordingly, the breadth and scope of the performance assessments conducted by stakeholders are adapted to the expertise and resources available—rather than the other way around. For example, performance assessments by river basin authorities typically adopt a pragmatic focus on hydrological impacts that better fits their expertise (engineering technicians) and resources (Decision Support Systems-DSS in place, data, others). TRANSCEND will overcome these constraints by **pooling complementary resources and knowledge** from stakeholders with relational competence (e.g., science-policy interactions). We will actively engage key public stakeholders as full partners or associate partners in each lab. This will contribute to legitimize the network, increase its credibility, build trust, and direct the attention of the network away from competition and towards reaping the benefits of cooperation.

Awareness building. We will build awareness about i) the benefits and opportunities of TAP and ii) the relevance of mainstreaming uncertainty in decision making. This includes making stakeholders aware of the need to consider ranges in their estimates, instead of single scenario predictions; while addressing potential backfire effects (e.g. stakeholders perceive that scientific understanding is becoming less rather than more clear). Critically, *stakeholder understanding and awareness of uncertainty* will influence their perception of TAP as an opportunity or a threat, and their attitudes towards interactions in knowledge networks. In fact, a major challenge in TRANSCEND is that its modeling framework is destined to produce a *wider rather than a smaller range of uncertainty*, which may be perceived by stakeholders and the public as if the scientific understanding of complex socio-ecological systems and water resources management is becoming less rather than more clear (Maslin, 2013). Failure to raise awareness on the relevance of

uncertainty analysis and science-policy interactions to develop *robust* TAP may delay the achievement of sustainable growth, allow *misinformation* to permeate (e.g., about climate change), and in some cases create opposition to reform among stakeholders (Coan et al., 2021). To address this challenge, we will conduct and stimulate science-policy exchanges within networks, supported by training and, where appropriate, debiasing and debunking exercises to address misinformation (such as the belief that irrigation modernization and other engineering solutions can solve on their own the water crisis) (Pérez-Blanco et al., 2021).

Knowledge sharing. We will define spaces and methods for knowledge sharing through well-defined and targeted engagement activities (workshops, technical meetings, virtual meetings). These activities will be supported by **scenathons**, or "scenario marathons", a type of serious game used to foster the understanding of complex scientific modeling and its integration into decision-making processes via experimental learning (FABLE, 2020). The strength of scenathons lies in their ability to engage stakeholders in innovation and experimentation in real life settings, so as to *stimulate transformational concepts and ideas* and *ease their implementation on the ground in practice*. TRANSCEND scenathons will pursue three main goals: 1) delivering scientific knowledge and providing familiarity with complex socio-ecological systems and ensemble modeling; 2) identifying challenges and opportunities in managing water-scarce socio-ecological systems and implementing TAP solutions under *deep uncertainty*; and 3) achieving science-based consensus towards the adoption of robust TAP that generates added value.

Governance and rules of engagement. In TRANSCEND, the rules of engagement will build on the **Talanoa Dialogue** adopted by UNFCC (UNFCCC, 2018), an empathic, inclusive and transparent conversation among participants to share stories, build trust, and make wise decisions for the collective good[1]. The Talanoa Dialogue was mandated by the Parties to the United Nations Framework Convention for Climate Change (UNFCCC) to take stock of the collective global efforts to reduce the emissions of greenhouse gases, in line with the goals of the Paris Agreement which are to limit the rise in average global temperature to 2°C above pre-industrial levels, and to pursue efforts to limit the increase to 1.5°C. The Talanoa Dialogue represents an opening up of the UN Climate Negotiations because non-state actors can actively participate and present their ideas on how national governments can improve their emission reduction targets. In the area of water resources, the use of this concept has been pioneered by the TALANOA-WATER Project (https://talanoawater.com) coordinated also by USAL, upon which we will build.

To govern engagement and facilitate exchange compliant with the Talanoa Dialogue principles, we will establish governance bodies and rules managing the interactions and behavior within the network. To build trust and communication among the stakeholders, in each lab we have appointed a key public stakeholder as **network manager**. The network manager will govern the network supported by the

[1] 'Talanoa' is a Tongan word which, however, indicates to a concept considered to be Pan-Pacific and used in Samoa, Fiji, Tonga, Cook Islands, Niue, Hawai'i and the Solomon Islands. Tala means to inform, tell, relate and command, as well as to ask or apply. Noa means of any kind, ordinary, nothing in particular, purely imaginary or void. The concept Talanoa carries several meanings across these different Pasifika contexts, but can be broadly defined as a conversation, a talk, an exchange of ideas or thinking, whether formal or informal, which is almost always carried out face-to-face.

scientific coordinator. This includes managing possible tensions and competition among stakeholders following well-defined rules of engagement. Moreover, to foster interchange across labs, we will establish an *international network board or 'network of networks'* that includes all network managers and Consortium partners. The **scientific coordinator** will be the link between the Consortium and the knowledge network, supplying all the necessary scientific inputs to the knowledge network, and organizing all project events within the corresponding living lab. The scientific coordinator will also take over the roles of the network coordinator when the network coordinator cannot deliver them. In case the scientific coordinator cannot deliver on his/her roles either, he/she will appoint a scientific coordinator from his/institution who will take over his/her tasks in the living lab. This framework will ensure sustained progress within the knowledge networks.

Adaptive efficiency. Networks will inevitably be subject to external pressures, some of which may be unfavorable and extreme. To minimize risks and speed up adaptation to change, we will study the organizational structures in place; monitor transaction costs (i.e. the institutional costs of administering, designing, monitoring, implementing and enforcing water policy arrangements); and design *adaptively efficient* networks that can identify and shift to superior alternatives as and when new information is made available, such as by adjusting its scope, changing its management, adapting to members joining/leaving the network, and *revising incumbent TAP* when they can be outperformed by alternative TAP (Loch and Gregg, 2018). Accordingly, TRANSCEND conceives knowledge networks and the institutions within as living dynamic entities that need to adapt and evolve with the climatic, scientific, technological and policy landscape. The efficiency in adapting to change will be assessed, studied and improved by recording and studying the trajectory of institutional transaction costs of the knowledge networks and its institutions, a valuable piece of information that is instrumental to understand whether we are investing in (i) trajectories with large transaction costs in which past decisions constrain future TAP (transaction costs increase) or (ii) trajectories with high network and institutional flexibility in which past reforms allow for relatively lower transaction cost-intensive TAP adoption (transaction costs plateau and/or decrease) (Garrick, 2015).

3.2. Actionable modeling suite

From a policy perspective, there is a fundamental policy need to better understand the interconnected dynamics and co-evolution of complex socio-ecological systems and their cascading uncertainties, and to capture them in actionable modeling tools that inform the adoption of robust TAP by stakeholders (challenge 2). To address this challenge, TRANSCEND will develop a socio-ecological modeling suite that enables stakeholders to explore, quantify, and negotiate trade-offs around the performance of alternative TAP options under deep uncertainty.

Recent advances in socio-ecological research have demonstrated the importance of considering the two-way feedbacks between environmental change and human behavior while seeking to design solutions to complex environmental challenges (Pande and Sivapalan, 2017). Ensemble experiments have also demonstrated the importance of characterizing uncertainty in modeling to formulate robust solutions (CMIP6, ISIMIP). Most recently, these two strands of literature have been combined into pioneering

ensemble experiments that characterize the cascading uncertainties across complex socio-ecological systems, including human-water systems, using a modular approach (Dolan et al., 2021; Toimil et al., 2021). However, this research has not permeated yet to policy makers and the DSS used in river basin planning and management, which rarely account for socio-ecological feedbacks, and ignore or insufficiently address uncertainties within and across systems.

Building upon recent scientific advances, our modeling suite will adopt a modular approach that captures the two-way feedbacks between socioeconomic and ecological systems (*multi-system*). Each system/module will be populated with multiple models (*multi-model*) relevant to water challenges and uses in different basins, which we will use to study the impacts of multiple scenarios and TAP (*multi-scenario*). Specifically, the suite will include models of climatic (CMIP6 and downscaled projections in CORDEX), hydrologic (i.a. SUMMA, VIC, HBV, GR4J), agricultural (i.a. AquaCrop-OS, DSSAT, APSIM, WOFOST), microeconomic (econometric and mathematical programming models such as PMP, PMAUP, LP), and macroeconomic systems (CMCC, USAL & UoM input-output and computable general equilibrium models, e.g. ICES); as well as other models (see e.g. CMIP6, ISIMIP, as well as water quality and ecological models to explore pollution-related problems in labs such as the Nitra RB) and systems deemed relevant by scientists and stakeholders during co-creation. Model integration will adopt a soft coupling approach, where the use and functionality of existing DSS tools are retained and new modular components are used to add detail or granularity (e.g., about agricultural water demand response to climate change) that can enable more robust TAP design and assessment. Partners have developed several of these DSS and modular add-ons/models, and have pioneered their integration in coupled socio-ecological (Di Baldassarre et al., 2018) and ensemble experiments (Pérez-Blanco and Sapino, 2022).

A key novelty of our project is that the modeling infrastructure developed will build upon rather than seek to replace or usurp the DSS tools used by stakeholders for water resources planning in labs: WEAP (developed by SEI), AQUATOOL (developed by UPV), TOPKAPI (co-developed by ARPAE), MIKE, RIBASIM, LISFLOOD. This is critical to ensure tools developed are useful to and usable by water managers and stakeholders in reality, while also enabling rapid implementation and impact of methods during the course of the project. By linking these DSS with recent advances in socio-ecological science and ensemble forecasting, we will deliver a **step change in the ability of planners to evaluate the co-evolution of complex socio-ecological systems and related uncertainties**, so as to identify robust TAP.

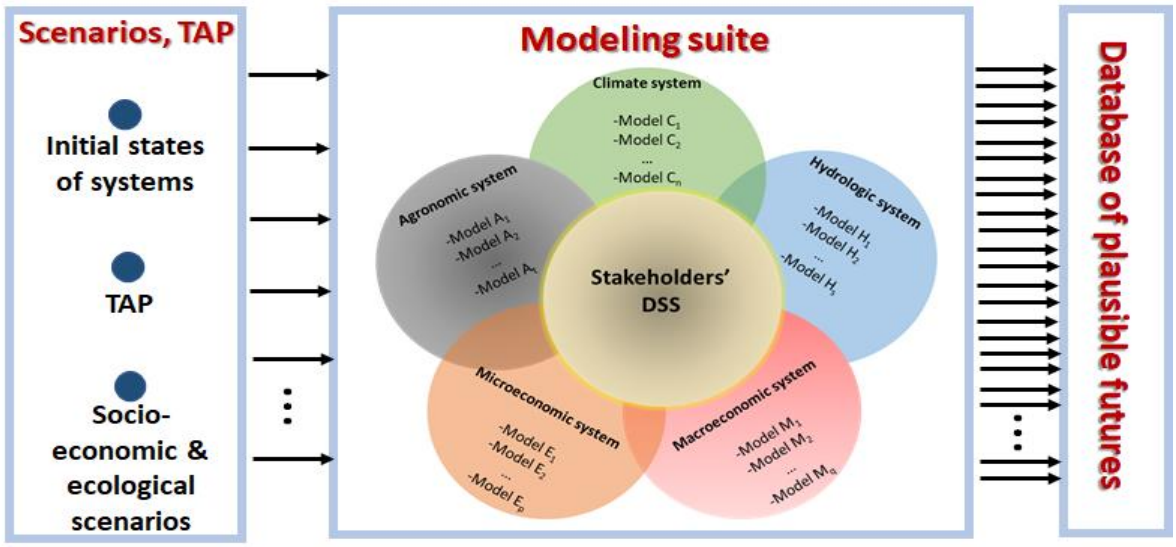

Figure 2: TRANSCEND modeling suite

3.3. Monitoring and accounting toolbox

While socio-ecological and ensemble modeling can guide design of TAP, implementation of policies in the real-world requires knowledge and tools that enable stakeholders to monitor performance, enforce rules related to water allocation and use, and trigger corrective action and reflective learning where outcomes deviate from expectations. Yet, in almost all water-scarce regions globally, water managers lack reliable or complete information to effectively monitor and review policies post-implementation, weakening the ability to effectively manage current and future water scarcity and conflict (challenge 3). Key examples of this issue are the widespread prevalence of illegal water use in many basins that has been found to undermine official allocation policies (Loch et al., 2020), along with failure to detect and learn from suboptimal socio-economic and environmental outcomes of water policies (Grafton et al., 2018; Higginbottom et al., 2021).

In TRANSCEND, **we will address these challenges through the development of a data-driven monitoring and accounting toolbox** that enables stakeholders to track critical user-defined indicators of water demand, water supply, and/or socio-economic impacts of TAP over space and time, while also providing critical baseline and historical data to parameterize, calibrate and validate socio-ecological models used for ex-ante TAP design and assessment. The toolbox will leverage both existing data resources and monitoring systems already used by stakeholders in each lab (e.g., in-situ metering, flow gauging, etc.), currently underutlised data from open-source high-resolution regional and global hydro-climatic (e.g. ERA-5 Land) and socio-economic databases, along with new data products developed through novel earth observation methods (e.g. satellite-based ET and land cover products such as SEN-ET or WaPOR). In doing so, the toolbox will provide methods and data to support a comprehensive scientifically-grounded

solution to existing gaps in monitoring of water policies (e.g. following FAO's Water Accounting Plus (WA+) framework).

Monitoring tools will be developed based on open-source programming and datasets. Interfaces and flexible coding workflows (e.g. Google Earth Engine apps, Jupyter notebooks) will be created to simplify use of tools by stakeholders, and to help facilitate updating and refinement of tools across basins and over time as water management challenges evolve over time. These features are particularly important in the context of planning under deep uncertainty, where TAP solutions may need to be refined over time as changes in climate or socio-economic conditions occur or as new information is gained about feedbacks between environmental change and users behavior.

3.4. Living labs

The knowledge networks (Pillar ①), the actionable modeling suite (Pillar ②), and the accounting and monitoring toolbox (Pillar ③) will be applied and empirically tested in 7 living labs: the Júcar River Basin (RB) in Spain; the Reno RB in Italy; the Tympaki RB in the Island of Crete (Greece); the Nitra RB in Slovakia; the Caplina-Mauri-Desaguadero System across Peru, Chile and Bolivia; the Orontes RB across Lebanon, Syria and Turkey; and the Mahanadi RB between the Indian states of Chhattisgarh and Odisha (see Figure 3). Integration of these three pillars will provide the logistics and scientific foundations to guide and drive a **co-creation process**, where the stakeholders and scientists share knowledge and exchange points of view, so as to identify opportunities for value-added creation, build consensus, and affect decision-making around TAP design and implementation. This will contribute to the stated objective of the EC Mission on Climate Adaptation of achieving systemic societal transformations in adapting to climate change (challenge 4).

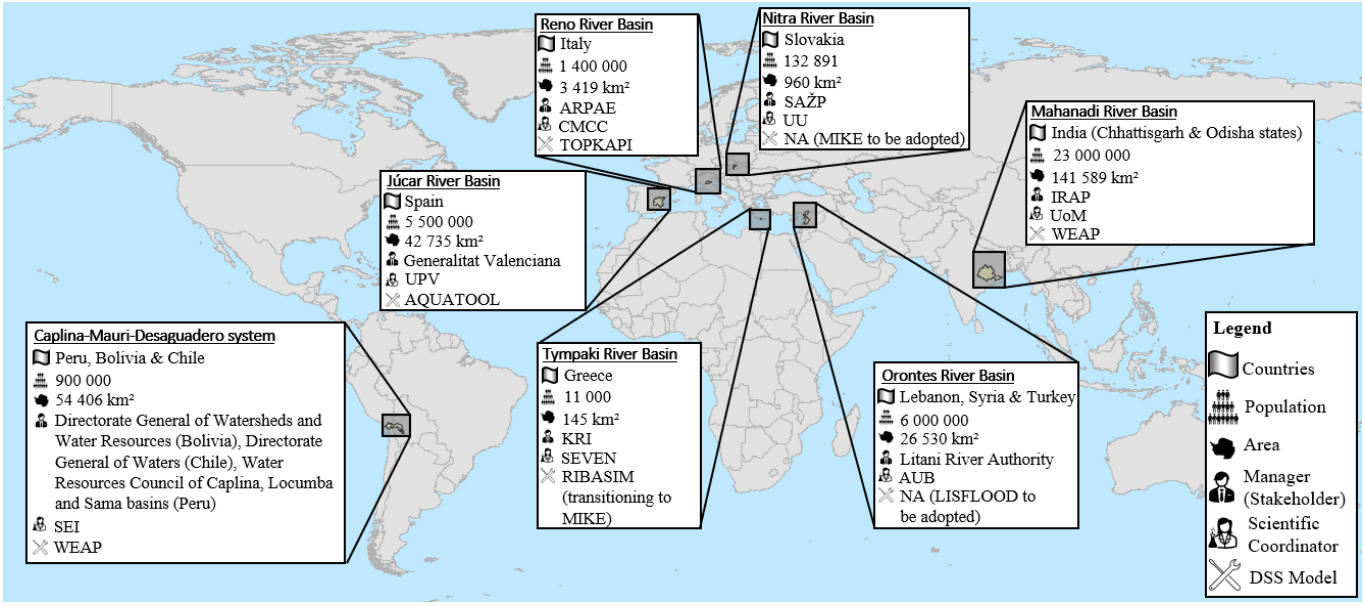

Figure 3: TRANSCEND living labs (note: WMS will replace LISFLOOD as the Orontes living lab DSS)

Table 2 provides a description of the living labs and a preliminary list of TAP to be explored. Table 2 builds upon the material included in the proposal and Description of Work, as well as the presentations delivered by each lab scientific coordinator during the Kick-off Meeting and available in Annex III, which updated some of the TAP.

Table 2: Pressures, challenges and preliminary description of TAP in living labs

Lab	**Pressures and management challenges**	**TAP (to be assessed & updated)**
ITALY – *Reno RB*	-Anthropic landscape with large irrigation-dependent ecosystems (wetlands, forests) through return flows; -Growing drought and scarcity due to climate change; -Irrigation modernization to mitigate economic losses reduces return flows; -Irrigation-dependent ecosystems at risk.	-Water allocation reform that recognizes return flows, unbundled rights; -PES to irrigators to prevent modernization; -Irrigation and climate services; -Insurance against extreme droughts.
SPAIN – *Júcar RB*	-Absolute scarcity, climate change expected to reduce water availability; -Frequency and intensity of drought episodes expected to increase; -Disputes between upper and lower basin farmers; -Groundwater depletion, theft.	-Water pricing and subsidies to improve technical efficiency... -...& allocation reform that recognizes return flows and adjusts water rights to avoid water depletion; -Non-conventional water resources; -PES via markets (buyback); -Enhanced monitoring using in-situ and satellite data, penalties for theft.
SLOVAKIA – *Nitra RB*	-100+ years of coal and lignite mining under transition as mines (14% of basin area) close in 2023; -Wetlands created by collapsed underground mines among areas with highest biodiversity in Slovakia; -Wetlands at risk of drying out if water supply from mines (>100 l/s) is not maintained; -Climate change will reduce water supply by up to 40% by 2030.	-Closed mines transition towards wetlands for protection of biodiversity, and water & carbon storage; -Pricing and subsidies to fund transition; -Centralized water allocation register; -Water allocation reform that recognizes return flows, unbundled rights.

GREECE – *Tympaki RB*	-72% of the basin is agricultural area, irrigation main water user, urban uses growing mainly due to tourism; -Faneromeni Dam built to cover irrigation water needs, yet demand still exceeds renewable supply; -Aquifer overdraft, saltwater intrusion, poor groundwater qualitative and quantitative status.	-Water pricing; -Unbundled rights, recognize return flows; -Enhanced monitoring using in-situ and satellite data, penalties for theft; -Insurance against droughts, explore EU solidarity fund against extreme droughts.
PERU, BOLIVIA & CHILE – *Caplina-Mauri-Desaguadero System*	-Transboundary system with limited cooperation; -Arid region, sensitive ecosystems to climate change (Poopó Lake in Bolivia); -Upstream (mining) v. downstream (irrigation, livestock) competition; -Inequity (small v. large permit holders).	-Inter-regional water allocation agreement, including groundwater; -Treated wastewater reuse, desalination; -Drought insurance & mutual funds; -Expand nature-based water retention areas and effective cost-recovery.
INDIA – *Mahanadi RB*	-Growing competition for water amongst water use sectors -Increasing incidence of extreme droughts and floods (delta) under climate change; -Irrigation demand exceeds water supply during low rainfall years; -Dispute between Chhattisgarh (upstream) and Odisha (downstream) states on water allocation (thermal plants, agriculture).	-Inter-state water allocation mechanisms & institutional structure; -Pricing and cross-subsidization to increase irrigation efficiency and develop water retention areas; -Enhancing multi-annual storage of large reservoirs -Introduce water rights that recognize return flows, explore trading.
LEBANON, SYRIA & TURKEY – *Orontes RB*	-Breadbasket for Lebanon (Beqaa Valley), Syria & Hatay (Turkey); -Imbalanced water allocation and use across countries; -Conflict, migration (mostly from Syria, including 3.6 million to SE Turkey, 200 000 to Beqaa Valley); -Growing competition between irrigation and domestic uses.	-Centralized water allocation register using remote sensing; -Transboundary water allocation agreement & institutional structure; -Quotas and voluntary reallocations for sustainable conjoint use; -Irrigation services, mutual funds.

Co-creation processes in living labs will be realized through the following tangible steps: 1) stakeholders and scientists *co-design* scenarios and relevant TAP, including financing mechanisms and partnerships to

create and operationalize sustainable investment into, and cost recovery of, TAP (contribution to SO-04); 2) stakeholders and scientists *co-develop* modeling efforts (contribution to SO-01); 3) stakeholders and scientists *co-evaluate* TAP performance; 4) stakeholders and scientists *co-identify* TAP with the highest potential (contribution to SO-03); and 5) stakeholders and scientists *co-implement* TAP on the ground (contribution to SO-02) (Figure 4). Note that as a result of continuous interaction and deliberation among stakeholders and scientists in the ecosystem of innovation, a likely outcome of the co-evaluation stage is to reset the co-creation process by considering alternative scenarios and TAP (co-design) and model setups (co-development). The result is an **iterative 'stock-taking' co-creation process**, where the stakeholders and scientists share knowledge, learn from each other, and collectively create value, until consensus is built and a suitable TAP is collectively identified and implemented. We will run three complete co-creation iterations per lab, each happening in the period between local workshops.

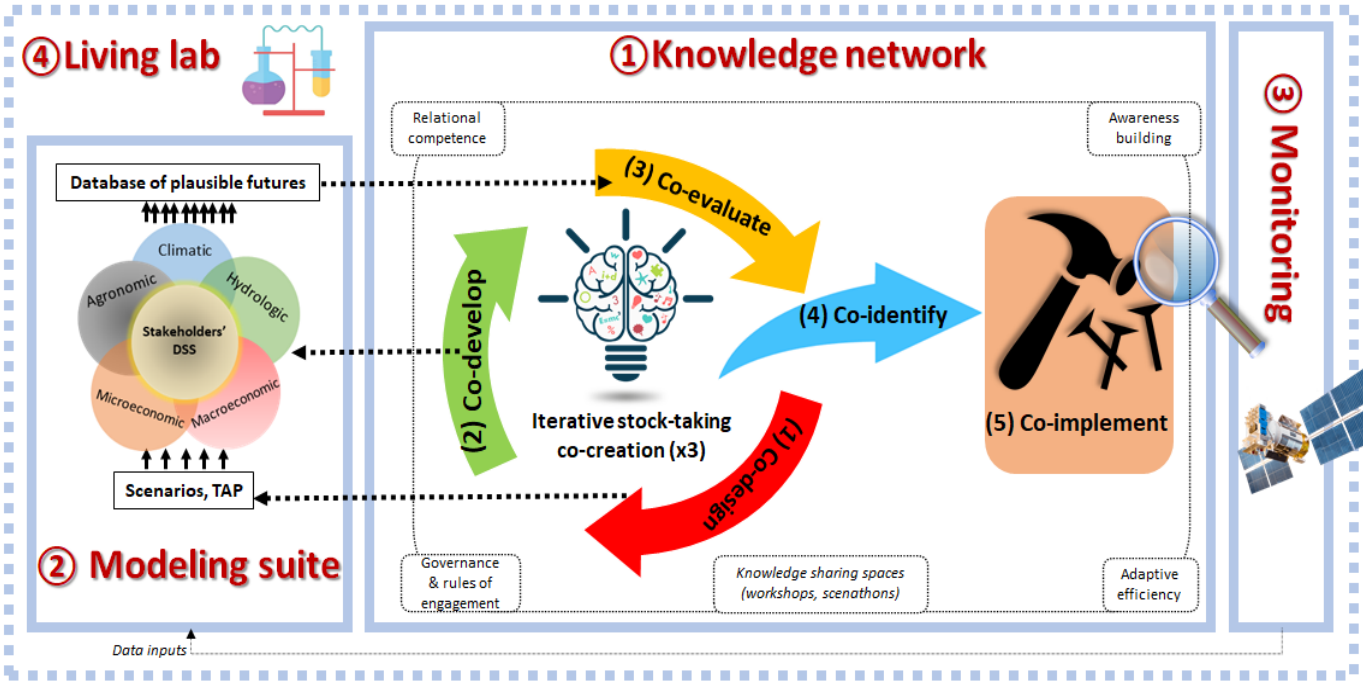

Figure 4. Overview of TRANSCEND ecosystem of innovation and co-creation process

Beyond the design and implementation of TAP in labs, we will deploy legacy actions and strategies (Section 2.2.1) to achieve the sustained adoption and update of TAP, including by establishing 8+ "inspiration" labs where the ecosystem of innovation will be initiated during the project's lifetime, and TAP adopted in 5-6 years—as compared to living labs where a full-fledged ecosystem of innovation will be developed and TAP adopted within the project's lifetime (contribution to SO-05). Moreover, we will synthesize and upscale our methods and results (Section 2.1.1) to inform national and supranational

adaptation strategies in the water, climate adaptation and other related sectors, including the European Green Deal key strategies (contribution to SO-06).

4. Pathways to impact and tools

4.1. Pathways to impact

The unique combination of proven expertise, excellent connections, dissemination and upscaling skills and academic insights enables TRANSCEND to achieve *all the outcomes* of the Call CL6-2022-CLIMATE-01 and contribute to *all the wider impacts* detailed in the destination "Land, ocean and water for climate action". Figure 5 below map our contribution to the expected outcomes (O) and expected impacts (I), distinguishing between scientific (blue), economic/technological (orange) and societal (green) outcomes/impacts (and combinations thereof). The distinction between scientific, economic/technological and societal outcomes/impacts was done based on the shared understanding of EC definitions developed between stakeholders in labs and Consortium partners over a series of meetings between Dec 2021 and Feb 2022. During the meetings, outcomes and impacts were presented to stakeholders in labs and they assigned them one or more categories, and then started identifying potential TAP to address them. Figure 5 represents the pathways we will follow from our project immediate outputs in 4 year time-period (measured through Key Performance Indicators—KPIs) to outcomes in the medium term (5-6 years) and impacts in the longer term (7-10 years).

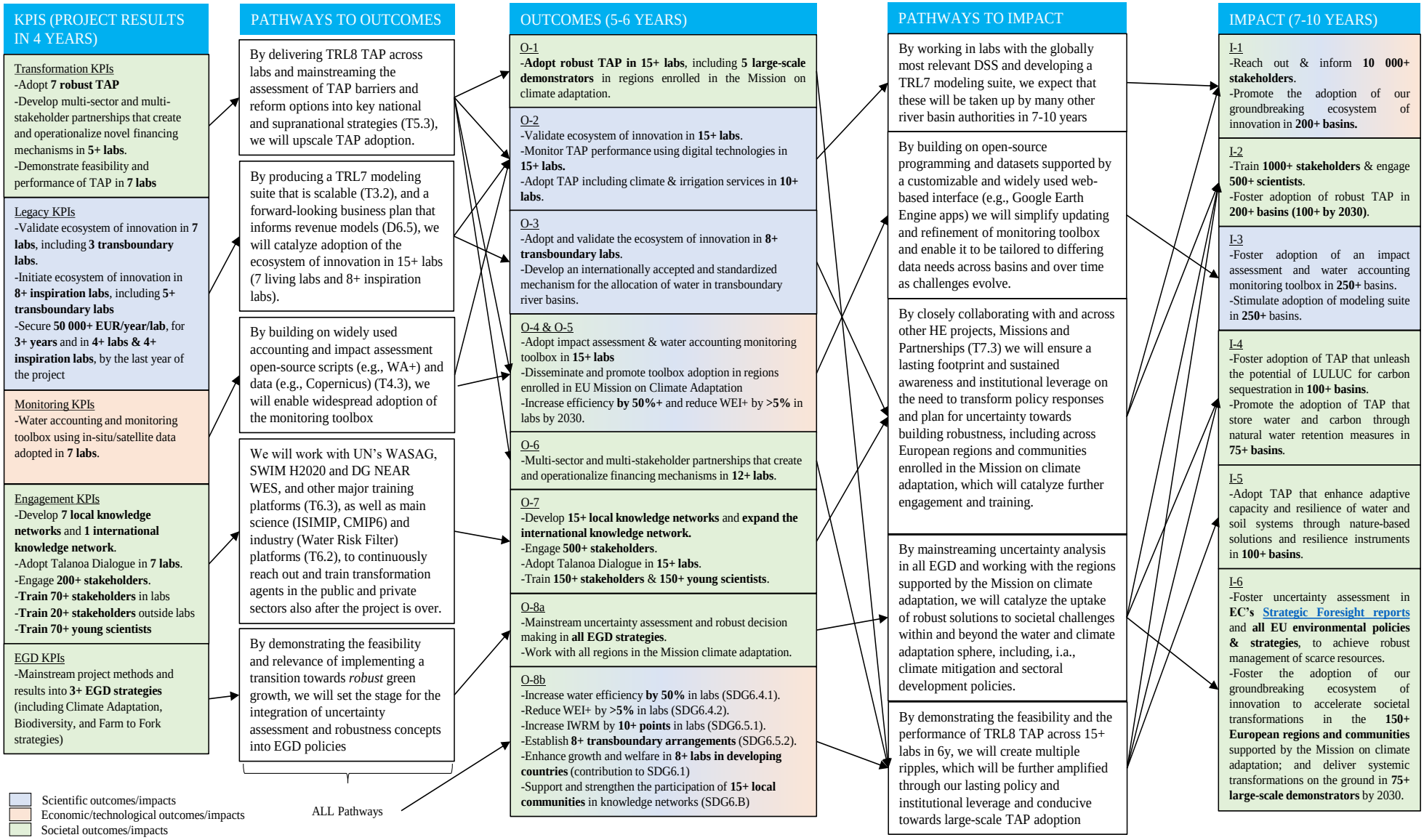

Figure 5: Project's pathways towards impact

4.2. Measures for impact

Our target audience are (i) regulators and decision-makers at various levels of government (river basin authorities, environmental agencies, EU and regional to national governments); (ii) utilities, industry (e.g., insurance) and users' associations (e.g., agricultural water users associations); (iii) civil society organizations (e.g., NGOs) and general public; and (iv) academia and research organizations (including young researchers and professionals).

Further to the knowledge networks that embrace representatives of all these groups in labs, we will use the dissemination, exploitation and communication measures above to address target groups beyond labs. All measures will be centralized in the online Virtual Forum to ensure fluent, inclusive and continuous knowledge sharing and co-creation across partners and stakeholders—also in the eventuality of mobility restrictions. Below we present the exploitation and dissemination measures, as well as the communication measures, we will use during TRANSCEND.

The key ***exploitation and dissemination*** measures are detailed below, and include: business plan; scientific publishing, project brochure, leaflets, policy briefs, newsletter; training; and policy leverage and upscaling.

- **Business plan.** The imitation of conventional business and marketing strategies are not or less suitable for the provision of water and climate services such as the TRANSCEND ecosystem of innovation. *First*, the value of TRANSCEND information is only revealed when end-users realize the cost saving or value-added potential which they may obtain from exploiting the ecosystem of innovation (i.e. the service). *Second*, potential end-users of the ecosystem of innovation are also an integral component of service development and value creation through co-creation. *Third*, we recognize that for the optimal and sustainable provision of the ecosystem of innovation as a new governance model the main beneficiary (i.e. the society as a whole) is not the most adequate/likely paying end-user of the service. The business plan, which will be fully developed in D6.5, will build on our co-creation experiences in living labs, where we will demonstrate the value added of TAP, so as to stimulate their adoption here and elsewhere. To underpin this process, the business plan will design a credible path to deliver the ecosystem of innovation (the *service*) to other legacy labs with similar challenges, DSS, or other commonalities.

To this end, the business plan will identify and target potential end-users of the service, including river basin authorities, environmental agencies and relevant EU, regional and national authorities. These authorities are in charge of achieving the objectives of the international (including, *inter alia*, the EGD, Climate Adaptation Strategy and Water Framework Directive) and national water, climate, socio-economic and innovation agendas; and will be critical drivers for the growth in the demand for TAP. We will work alongside potential end-users and other stakeholders to co-create the innovative TRANSCEND modeling suite and ecosystem of innovation in 7 labs, provide a transparent and exhaustive description of the cost structure, and assess the environmental, economic and financial return this service may offer. This information will be integrated into our business plan, which will describe the pathways adopted for the delivery of the ecosystem of innovation within the labs, as well as other plausible pathways that may be

beneficial for other labs (e.g., leveraging on EU Mission Adaptation funds). Co-creation will be highly instrumental towards revealing the cost-saving and value-added potential that end-users can obtain from TAP; and to shape expectation and acceptance and extract value of the service. This will provide other end-users beyond labs (e.g., in legacy labs) with relevant knowledge, including on agents whose activities put water bodies under stress or directly/indirectly benefit from the results of TAP, which may contribute to the financial sustainability of the service provision through, e.g., pricing policies.

➢ **Scientific publishing, project brochure, leaflets, policy briefs, newsletter.** The initial dissemination package will include a leaflet and brochure on the business imperative to consider TAP in the operations of stakeholders, including decision-making. The executive summaries of major deliverables will be translated into policy briefs addressing specific audiences in labs and will be designed following the EC Guidance. Biannual newsletters will be elaborated targeting key stakeholders. All these products will be multilingual to ensure wide dissemination.

Partners are closely connected to *scientific publishing*, and several team members are current members of editorial boards of renowned scientific journals in multiple disciplines, including Water Resources Research, Environmental Modeling and Software, Climatic Change or Earth's Future, to name but a few. As a part of our communication and dissemination activities, we will produce scientific articles and special issues in the above and other JCR Q1 journals showcasing project results, including the publication of 10+ papers *per year*. We will submit and publish one paper showing the results of the TRANSCEND Project to Nature and/or Science. The articles in high impact journals will be accompanied by short webinars. All papers will be published **gold open access** leveraging on resources made available by our organizations, and working papers published in online repositories.

➢ **Training activities.** TRANSCEND will train the critical *transformation agents* needed to catalyze societal transformation and TAP to water scarcity and climate change, including 1) stakeholders and 2) young scientists.

- Stakeholder training: We will organize training events back-to-back workshops and webstivals to build the capacity of decision-makers and stakeholders in labs and beyond to integrate the value of TAP and the ecosystem of innovation into river basin planning. We will collaborate with UN's WASAG, SWIM H2020 and DG NEAR WES training networks, as well as other major training initiatives, to train regulators as well as entrepreneurs, climate innovators and users. Partners also coordinate a number of postgraduate courses on water resources management taught in English and local languages (e.g., the MBA on *Management of Agri-food businesses* at USAL), where the cutting-edge knowledge and methods developed in TRANSCEND will be further disseminated, and stakeholders engaged. As partners of Climate-KIC, we will participate in Pioneers into Practice, consisting of bespoke transitions thinking and systems innovation mentoring delivered through a structured workshop programme and online training. Training activities will also engage stakeholders outside labs, to foster replication and upscaling.
- Academic training: The training of transformation agents in academia will be articulated through in-house academic programmes and facilities and summer/winter schools. Most partners coordinate postgraduate programmes on the management of water scarcity and climate change (e.g., MPhil/PhD

programmes on Earth Science at UoM and UU). Partners (e.g., CMCC) regularly organize Summer and Winter Schools for young scientists and practitioners, and we will build on this relevant expertise to organize throughout the lifetime of the project **two Summer/Winter Schools**. One of them will be organized, if possible, in partnership with UU's Summer School (this option will be explored during the coming months).

➢ **Legacy.** Our legacy strategy aims to ensure a lasting footprint of the project, including the sustained and periodic update of the ecosystem of innovation in living labs. We will also establish "inspiration" labs across the world that explore robust TAP adoption using TRANSCEND's methods, including in transboundary basins where we aim to set a standardized approach. The key assets needed to successful legacy and replication include:

- We will develop a critical pool of *transformation agents* to sustain, and where needed expand (e.g. new models, additional monitoring data), the ecosystem of innovation after the project ends. To build this pool of agents, we will train 70+ stakeholders in labs, as well as 20+ stakeholders from outside labs; and 70+ PhD students.
- Leveraging on the demonstrated value added of our approaches, and potential sources of revenue for funding the ecosystem of innovation after the project is over identified D6.5, we will seek and secure additional investments to ensure the sustained and periodic update of the ecosystem of innovation. We expect to secure by the last year of the project, *at minimum*, 50 000 EUR/year/lab over a period of 3+ years in 4+ living labs & 4+ inspiration labs to finance the maintenance and update of the ecosystem of innovation, including direct financial contributions and monetized in-kind contributions (e.g. a worker/group of workers dedicated to the update of the modeling suite, monitoring toolbox and ecosystem of innovation).
- We will closely work with communities and regions beyond labs, including those supported by the EU Mission on climate adaptation and societal transformation. We will keep them updated on project outputs and engage with them in key project activities, including outreach events, webstivals and international workshops, where we will showcase the performance of TAP and the ecosystem of innovation and seek their feedback to address gaps that may prevent replication. This will lead to the identification and initiation of 8+ inspiration labs.

We consider that achieving 15+ labs (including 5 large-scale demonstrators in regions enrolled in the Mission on climate adaptation), 160+ transformation agents and 8+ labs with a minimum investment sustained for 3+ years will provide the basis to achieve, with high confidence and in the medium term (5-6y), a *critical mass* of end-users and resources that ignites far-reaching and rapid transformation towards a water scarcity- and climate-proof society within and *beyond* living labs in the longer term (7-10y). We will constantly monitor the performance of training, replication and fundraising activities through an *ad-hoc* Impact Champion developed in WP1 (task T1.6).

➢ **Policy leverage and Upscaling.** Partners are closely connected to major EU and international water- and climate-related platforms (IPCC, EGD expert groups and networks, HE Missions, UNDRR Sendai Framework for Disaster Risk Reduction, IWRA, UN FAO), as well as all major national and regional networks in labs. This includes active engagement in major policy initiatives such as the comparative

assessment of drought management plans that FTC will develop in 2022-2023 for the European Commission DG ENV, as well as informing basin management plans such as the second planning cycle in Greece, currently ongoing and supported by SEVEN, where we will aim to set TRANSCEND ecosystem of innovation as the standard for river basin planning.

We will leverage this comprehensive expertise and networking capacity to maximize the out- and in-reach of the project. We will review and synthesize existing knowledge, and work closely and attentively with stakeholders, expert groups and policy platforms and networks from regional to global levels, to identify legal, policy and regulatory barriers and reform options to upscaling implementation of TAP across the EU and beyond (task T5.1-5.3). We will actively contribute to the design of river basin management plans in labs (EU's third planning cycle), while seeking opportunities to contribute to supra-national and national strategies for water resources management, climate adaptation, disaster risk reduction, sustainable development, and ecosystem protection in the EU and beyond. We will author/co-author chapters in the DRMKC report 'State of Science in DRM', leveraging on the coordinating role of members of the Consortium, and actively inform the development of the United Nations World Water Development Report and the UN Global Assessment Report (GAR) on Disaster Risk Reduction, while actively seeking to contribute to other flagship reports produced during TRANSCEND's lifetime. We will liaise with principal innovation platforms, including Climate KIC, to amplify the impact of our activities and boost transformational adaptation to water scarcity and climate change.

The key ***communication*** measures are detailed below and include: online communication and the Virtual Forum; Workshops; and Outreach.

- **Online communication and the Virtual Forum.** The need for a sound online communication approach has been amplified by the recent COVID-19 pandemic, which significantly restricted mobility to different degrees, including in regions and countries where TRANSCEND labs, partners and stakeholders are located. This calls for the revision and adaptation of communication approaches to the new context. Beyond the conventional approach that uses online communication as an "information clearing-house" or "info-point", we will use online communication also as a tool to actively engage, discuss, build consensus, take decisions and coordinate actions in labs. Online communication will be centralized and managed through the **Virtual Forum**, the communication hub of TRANSCEND, which encompasses all channels of communication in the project, including live online access to workshops and events.

The Forum will be articulated through two main platforms: the **website** and the mobile **app**. Both platforms will feature professional design and communication standards that ensure ease-of-access and ease-of-use. The website and the app will be designed in a way that is appealing to a diversity of users, guiding the different audiences to products of their interest, including: live online access to project workshops, meetings and training, short news, repository of project results (digital library), access to social media, and a blog that stages interviews, opinion articles and policy briefs. The web and the app will employ state-of-the-art web services including interface to Twitter, Facebook, YouTube and other social media; and connect to partners' profiles (Twitter, Facebook) and YouTube channels. We will use videos

and other interactive tools for dissemination, where we will employ scribing techniques that are based on mind-mapping and graphical skills of a scribing artist to synthesize complex issues in a way that is accessible to users of different backgrounds and expertise.

The Virtual Forum will aptly complement and underpin, and where necessary substitute, in person communication during the project. **In person communication** will be adopted, where possible, for local and international workshops, training events, and outreach events. In person meetings have a number of advantages over online meetings: they make possible the use of body language, make misunderstandings less likely, increase discipline and concentration, facilitate social exchange, create stronger bonds among participants, catalyze networking, and create a healthy team culture; all of which can be only partly achieved through online interaction. **Online communication** will be the default for webstivals, webinars and foresight and technical and foresight meetings with limited content and participants, so as to economize time and other resources. Online communication will be also adopted where in person interaction in workshops, training and outreach events is not possible for some or all participants, including due to COVID-19 mobility restrictions. Major stakeholder engagement activities in workshops and training events will include a virtual interface and allow for both in person and remote simultaneous participation, while ensuring fluent communication. All workshops and events will be widely advertised, broadcasted live, recorded, and uploaded to the digital library. This will inform all participants in knowledge networks on the progress and activities in the labs, while making the process *transparent*, thus contributing to build trust among members. We will deploy **sensible virtual engagement techniques and tools** to fully unleash the potential of online communication and ensure continued and active interaction and knowledge-sharing. Leveraging on the Forum channels and platforms, we will apply deep listening and media monitoring tools to better target our communication products; listen actively to online conversations, the media landscape and (key) stakeholders, so to understand underlying currents; audit stakeholder engagement and digital lobbying to map engagement dynamics; and revise online engagement towards strengthening stakeholder engagement/endorsement of TRANSCEND methods and results (advocacy). These functions cannot or can only be partly achieved through in person communication. The upshot is a comprehensive communication strategy that combines the strengths of online and in person communication, and aptly addresses obstacles to in person communication, towards a successful science-policy engagement and co-creation process.

➢ **Workshops.** TRANSCEND adopts an iterative stock-taking co-creation process where stakeholders and scientists gather in 4 annual local workshops in the context of each living lab, and in 2 international workshops involving all labs (held at partners' premises in Venice—month 25—and Valencia—month 42); complemented with continuous engagement in technical and foresight meetings, training and other events. The objectives, month and participants of workshops are described in Table 3. Workshops 2, 3, 4 and 5 will field *scenathons* to integrate complex scientific modeling and related outputs into knowledge sharing and better understand how stakeholders make decisions, so as to enhance transparency and trust, build consensus, and deploy TAP. Workshop 6 will conduct a collective assessment of outputs and implementation plans and catalyze the further development of legacy and upscaling actions, including

definition of inspiration labs. We will produce policy briefs ahead of workshops to continuously inform stakeholders on project progress and deliver key information.

Table 3: Objectives, participants and date (in months from the start of the project, M) of the workshops

No	Workshop title	Objectives & participants	M
1	1st local workshop	Scene setting, momentum building; research gaps, challenges and uncertainties; exploratory co-design and co-development. **Participants**: local stakeholders	8
2	2nd local workshop	*Scenathon;* co-evaluation; revision of TAP, scenarios and modeling suite (*iterative stock-taking process*). **Participants**: local stakeholders	19
3	1st Int'l workshop	*Scenathon;* cross-fertilization; collective identification of gaps and challenges, and TAP with high potential. **Participants**: int'l network board, other key stakeholders.	25
4	3rd local workshop	*Scenathon;* exploratory co-identification; revision of TAP and scenarios, new iteration(s). **Participants**: local stakeholders	30
5	4th local workshop	Presentation of detailed modeling results in *scenathon*, co-identification; plan for co-implementation of selected TAP in labs. **Participants**: local stakeholders	36
6	2nd Int'l workshop	Collective assessment of outputs and co-implementation plans; barriers & reform options for upscaling and legacy; define inspiration labs. **Participants**: int'l network board, other key stakeholders	42

➢ **Outreach events.** We will hold seminars and panel discussions at major industry/users, associations/regulators and citizen events, as well as at OECD, World Bank, EEA, JRC and EC events. We will organize side-events to present results at major scientific and outreach events, including Climate-KIC Innovation festivals, EIP conferences and the World Water Congress, among others. We will also organize annual webstivals through the Virtual Forum to showcase activities across labs and share experiences. Table 4 identifies key international outreach events that we will attend, where we will convene targeted sessions and/or side events, aiming at amplifying the impact of our outreach and *upscaling* activities—including identification and definition of inspiration labs.

Table 4: Preliminary list of international scientific and outreach events we will attend/organize

Activity/Event	Target Audience	Objectives
European Innovation Partnership (EIP) Water Conference	Regulators, utilities, water users, industry, civil society, general public	-Spread and publicize outcomes -Learn about front-line innovation -Forge coalitions and partnerships
EIT Climate KIC Innovation festivals		
IWRA World Water Congress	Regulators, utilities, industry, academic community, civil society organizations	-Disseminate TAP, ecosystem of innovation, labs results -Establish collaboration -Identify and define *inspiration labs*
EU Climate Change Adaptation Conference		
UN's WASAG Network meetings		
IAHS Conferences		
Researchers' night	Broader society, citizen panels	-Present TAP & project outcomes -Engage citizen panels across labs

Table 5 summarizes all the ***dissemination, exploitation and communication measures by target group***.

Table 5: Dissemination, exploitation and communication measures by target groups

Regulators: river basin authority, environmental agency, or equivalent body managing water resources	**Regulators: EU and regional to national governments**
• 28 Local workshops, 2 international workshops • Virtual Forum (website, mobile app) • 70+ Technical and foresight meetings • 34 Training events (in workshops & webstivals) • 28 Newsletter, 7 brochure and leaflets (multilingual) • Twitter, Facebook and other social media • 3 Video presentations (scribble) • 12+ Webinars • 30 Policy briefs ahead of workshops • All project deliverables	• 28 Local workshops, 2 international workshops • Virtual Forum (website, mobile app) • 70+ Technical and foresight meetings • 34 Training events (in workshops & webstivals) • 28 Newsletter, 7 brochure and leaflets (multilingual) • Twitter, Facebook and other social media • 3 Video presentations (scribble) • 12+ Press releases in (local) newspapers

• 40+ Scientific papers • 45+ Outreach events, 4 webstivals • 3 Open data sets • Portals – FAO Aquastat, WaPOR, EEA, Climate Adapt • Online catalogue of TRANSCEND-enabled services	• 3 Open data sets • 30 Policy briefs ahead of workshops • All project deliverables • 45+ Outreach events, 4 webstivals • Online catalogue of TRANSCEND-enabled services
Academia and research organizations	**Utilities, industry and users' associations**
• 28 Local workshops, 2 international workshops • Virtual Forum (website, mobile app) • 2 summer/winter schools • 28 Newsletter • All Deliverables • 30 Policy briefs ahead of workshops • 12+ Webinars • 40+ Scientific papers • 45+ Outreach events, 4 webstivals • 3 Open data sets • Portals – FAO Aquastat, WaPOR, EEA, Climate Adapt • 15+ Staff exchanges	• 28 Local workshops, 2 international workshops • Virtual Forum (website, mobile app) • 34 Training events (in workshops & webstivals) • 28 Newsletter • 3+ Targeted brochures, e.g. COPA-COGECA • Twitter, Facebook and other social media • 3 Video presentations (scribble) • 30 Policy briefs ahead of workshops • 45+ Outreach events, 4 webstivals • 3 Open data sets • Portals – Water Risk Filter, EEA, Climate Adapt • Online catalogue of TRANSCEND services
Civil society organizations	**General public**
• 28 Local workshops, 2 international workshops • Virtual Forum (website, mobile app) • 3 Video presentations (scribble) • 28 Newsletter • Twitter, Facebook and other social media • 30 Policy briefs ahead of workshops • 45+ outreach events, 4 webstivals • Science-society events (e.g. Researchers' Night) • Portals – Water Risk Filter, EEA, Climate Adapt	• 14 Local citizen panel meetings, 1 int'l meeting • Virtual Forum (website, mobile app) • 28 Newsletter, blog, brochure • 3 Video presentations (scribble) • Twitter, Facebook and other social media • 14+ Press releases in (local) newspapers • Portals – Water Risk Filter, EEA, Climate Adapt • 14+ Citizen science events (researchers' night) • 4 webstivals

5. Organizational structure and decision making

The management configuration is simple, clear, effective and responsive to possible implementation risks.

The TRANSCEND Consortium involves well-experienced institutions and many of them have worked together in the past. Each partner has clear responsibilities and defined roles, and this aspect will contribute to successfully achieve the project's objectives. The governance and decision-making mechanisms have been designed in a clear and simple way as to maximize effectiveness and impact while minimizing administrative burden, and are defined in detail in the Consortium Agreement, and summarized below. The appropriateness of TRANSCEND management is ensured by 6 key features, which are discussed in detail below: Consortium Agreement, Internal Communication, Decision-making mechanisms, Quality assurance and control, Knowledge Management, and Gender Balance.

Consortium Agreement (CA): The organizational structure and decision-making mechanism is defined in detail in the CA, which has been signed by all participants. The CA has been defined in accordance with the DESCA model contract. The Consortium Agreement describes a) the internal organization of the Consortium, the project's governance structures, responsibilities, tasks and obligations of the participants, decision-making processes and management arrangements, as laid down in the Grant Agreement with the European Commission; b) the distribution of the budget among the participants; c) a policy on publications, press releases and reports to the European Commission; d) liability and indemnification; e) provisions for the settlement of disputes within the partnership; f) management of the intellectual property rights (which will be further substantiated in D6.1 – *Detailed and revised PDEC and IPR strategy*).

Internal Communication: The Project General Coordinator (PGC), with the support of the Project Manager (PM) (see below for a description of management bodies), will implement transparent and continuous communication among management and advisory bodies. First, an interactive Virtual Forum with website will be set up by month 3 of the project and support research, engagement, progress tracking and document management. Second, an adequate number of internal meetings of the management bodies have been planned during the lifetime of the project. In particular, the kick-off meeting of the project took place in Month 2 (see Annex II), and other four in-person General Assemblies will take place in partners' premises in Uppsala (month 12), Heraklion (month 24), Valencia (month 35) and Venice (final project conference, month 48). The Management Board (MB) and Steering Committee (SC) meetings will be organized by USAL and take place very year and every four months, respectively (see the project calendar). Finally, virtual meetings, including conference calls and webinars, will be held. These will be particularly important for the efficient communication within WPs and tasks. The use of virtual meetings as well as back-to-back and side-to-side meetings with other project and community activities will help to reduce travel costs.

Decision-making mechanisms: The PGC has the role of final arbiter throughout the entire project in all matters concerning project management and financial management/control. USAL will operate within the terms of the CA and with the support of the SC to resolve issues or disputes. Decisions at the strategic project level are prepared by the MB and PGC and taken by the SC.

Quality assurance and control: The quality of the deliverables will be assured by the partner leading each WP. The internal review process will be as follows: Deliverables will be delivered at least 1.5 months ahead of the submission deadline to the coordinator, who will revise the document with the support of two other

PIs not involved in the relevant task/deliverable. When necessary, the WP leader can request support from other Consortium partners or the External Advisory Board (EAB) leveraging on the resources made available for external reviews in the budget. Reviews will be sent (at least) one month before deadline back to deliverable authors, who will ensure the deliverable is uploaded before the deadline. For the first eight months of the project, it has been agreed that deliverables will be sent for review two weeks ahead of the deadline, and sent back to reviewers one week before deadline, given the demanding calendar. In all cases, deliverables should be uploaded before the submission deadline.

Internal and external (through knowledge networks) peer reviews will ensure high quality standards of TRANSCEND deliverables. The PGC will submit the deliverable once the expected quality is achieved. Key deliverables have been timed in order to allow for stakeholder feedback before final delivery. Finally, the PGC, with the support of the PM and the SC, will continually assess the risk of delays in the project work plan in order to issue a timely response to such contingencies. In these instances, contingency planning will be initiated and presented to the PGC.

Knowledge Management: The partners have a collective responsibility to ensure that any knowledge generated through the project is appropriately protected and shared. The PGC is responsible for the project's knowledge management strategy, ensuring it is kept up to date and that the associated protocols are adhered to. Knowledge management and intellectual property rights are addressed in full compliance of the rules identified by the Horizon Europe Programme of the European Commission for Research. Project results will be open access and downloadable free of charge. The Consortium will publish under gold open-access in peer reviewed journals. Any dissemination activities and publications during the project, including the project website, will (i) acknowledge that the project has received EU funding and (ii) display the EU flag, as required by the program rules.

Gender balance: By signing the Grant Agreement, the Consortium will commit to promoting equal opportunities during the implementation of the project, and makes a commitment to achieve gender balance at all levels of staff assigned to the project, including at supervisory and management levels. The Consortium is aware of the importance of attracting, retaining and advancing high quality female scientific researchers and TRANSCEND will ensure that where applicable it works to satisfy the Horizon Europe objectives of gender balance and integration. The TRANSCEND Consortium appreciates and will build upon the outcomes and recommendations of the Beijing Platform for Action adopted at the Fourth World Conference on Women (UN, 1995) and the EU implementation reports on the critical area of concern "Women and the Environment", and specifically on "Gender Equality and Climate Change" (EIGE, 2012). We will specify gender-sensitive indicators to monitor access to and use of water in pilot water laboratories. Furthermore, we will pay regards to the outcomes of the Conference on the Gender Dimensions of Weather and Climate Services (UNESCO, 2014), which explored women and men empowerment for the sake of building safer, stronger and more resilient societies "through the provision and use of gender-sensitive weather and climate services", and monitor and promote women access to training and transformational adaptation strategies such as irrigation services throughout the project; as well as a gender-balanced stakeholder engagement process.

Below we present aspects relevant to the organizational structure of the Consortium, including the roles of the Coordinator, Management Board (MB), Steering Committee (SC), and External Advisory Board (EAB). These are specified in detail in the Consortium Agreement signed by all partners. We also present an update of the risks and contingency planning strategy of the Consortium. Finally, the last sub-section presents other practical arrangements made among parties that are of relevance for the adequate governance and management of the Consortium.

5.1. Project Coordinator

The **Project Coordinator** (USAL) has overall responsibility for the smooth running of the project implementation and of the timely submission of high-quality deliverables. The Project General Coordinator (PGC) represents the Coordinator in the Steering Committee and the Management Board. The PGC will be supported by a deputy coordinator, the Project Manager (PM), and administrative assistant and a financial assistant, as well as an ethics mentor appointed by the coordinator financial & legal departments. The PM supported by the administrative assistant will be in charge of:

1) the day-to-day management of the action;

2) monitoring of planning and progress of the action;

3) proposals for corrective and preventive actions;

4) facilitating the communication within the consortium;

5) coordinating the reporting for the European Commission;

6) setting up of project meetings and reviews;

7) making sure that project outputs (documents etc.) are made available and shared with the partners.

For this project, USAL has appointed Dr Pérez-Blanco (Dionisio.perez@usal.es) as the Project General Coordinator (PGC), and Dr Julio Pindado as Deputy Coordinator. Dr Pérez-Blanco will be assisted on an operative level by a **Project Manager** (PM), Mr Héctor González López (hector.gonzalez.lopez@usal.es); and an administrative and financial assistant, Ms. María Cruz Mateos Cabezas (proy.europ.invest@usal.es). The PM will be responsible for day-to-day project management, supported by the administrative and financial assistant and the highly experienced personnel from the USAL's legal and accounting departments.

5.2. Management Board

The **Management Board (MB)** supervises implementation of the key consortium plans (Dissemination, Exploitation and Communication, Data Management Plan) and provides strategic guidance to the Steering Committee. The MB is integrated by the PGC, PM, and WP leads, and will meet online every 12 months to monitor and review the progress and results, conduct quality control (internal review), proactively identify critical risks & challenges, and revise the contingency risk measures. Dates of MB meetings have been already defined and are available in the project calendar accessible to MB members. The MB is intended to monitor the key consortium plans and provide strategic guidance to the SC, which is the body with decision making power.

Table 6: MB members

Participant No	Representative	Organization	Country
1 PGC	C. Dionisio Pérez-Blanco	USAL	Spain
2 WP1	Jaroslav Mysiak	CMCC	Italy
3 WP2	Tania Santos	SEI	Sweden
4 WP3	Giuliano di Baldassarre	UU	Sweden
5 WP4	Tim Foster	UoM	UK
6 WP6	Cinzia Alessandrini	ARPAE	Italy
7 PM	Héctor González-López	USAL	Spain

WP5 and WP7, coordinated by USAL, are represented by participant nº 1, the PGC.

5.3. Project Steering Committee

The **Steering Committee** (SC) is the decision-making body of the consortium and is a forum for the general discussion of all issues of the project. The SC decides on project processes considering proposals and suggestions of the Coordinator and the MB, including on critical risks and contingency planning. The SC is composed of one representative from each Party and will meet every 4 months to deliberate on strategic choices such as amendments of the Grant Agreement and Consortium Agreement, supported by the PM. Dates of SC meetings have been already defined and are available in the project calendar accessible to SC members.

Table 7: SC members

Participant No.	Representative	Country
1 **USAL** (Coordinator)	C. Dionisio Pérez-Blanco	Spain
2 **CMCC**	Jaroslav Mysiak	Italy
3 **UU**	Giuliano di Baldassarre	Sweden
4 **FTC**	Guido Schmidt	Austria
5 **UPV**	Manuel Pulido-Velázquez	Spain
6 **SEI**	Tania Santos	Sweden
7 **UoM**	Tim Foster	UK
8 **ARPAE**	Cinzia Alessandrini	Italy
9 **SAŽP**	Radoslav Považan	Slovakia
10 **SEVEN**	Maggie Kossida	Greece
11 **AUB**	Hadi Jaafar	Lebanon
12 **KRI**	Marinos Kritsotakis	Greece
13 **SVP**	Katarina Farbiaková	Slovakia
14 **IRAP**	Dinseh Kumar	India
15 **ASU**	Michael Hanemann	US

5.4. External Advisory Board

The **External Advisory Board** (EAB) is an advisory body composed of outstanding science, finance, and policy experts. The EAB will provide advice on scientific direction and impacts, help to identify existing synergies, support impactful exploitation, and conduct quality control as part of our external review strategy (complemented and supported by stakeholders as part of our open-science strategy). The composition of the of the EAB (4-5 members) will be agreed in the first SC meeting in February. The members proposed to the EAB in the Kick-off meeting are available in the table below and in Annex II of this deliverable (minutes of the Kick-off meeting). The recording of the kick-off meeting and first SC meeting will be both made available in the Virtual Forum and website in month 3.

Table 8: EAB proposed members (final list of 4-5 EAB members to be decided during the first SC meeting)

Surname	Name	Affiliation	Expertise (indicate the relevant WP)	Endorsed by:	Notes
Jakeman	Tony	ANU Canberra	hydrological modelling, OpenMI, model practices	CMCC	https://researchers.anu.edu.au/researchers/jakeman-aj Sina Khatami: Tony is semi-retired, if not available an alternative is Joseph Guillaume (same institute),

Koetz	Thomas	Climate KIC	transformational change, resilience, NbS	CMCC	https://www.linkedin.com/in/thomas-koetz-310a7711/?originalSubdomain=be
Zal	Nihat	EEA - European Environmental Agency	WEI+, water indicators, Eionet	FT	Key person behind water quantitative assessments in the EU. https://www.researchgate.net/profile/Nihat-Zal
De Stefano	Lucia	UCM - Universidad Complutense Madrid	drought management, risks, transboundary	FT	Drought management, including transboundary. https://www.ucm.es/geologia-ambiental/file/cv-lucia-de-stefano
Hernandez-Mora	Nuria	FNCA - Fundacion Nueva Cultura del Agua	water policy and governance	FT	https://es.linkedin.com/in/nuria-hernandez-mora-phd-0b65b73?original_referer=https%3A%2F%2Fwww.google.com%2F
Máñez Costa	Maria	GERICS-Climate Service Center Germany	Climate services development, participatory modelling, co-development of adaptation measures. Relevant for WP2	UPV	https://www.gerics.de/about/team/062499/index.php.en
Scott	Chris	Penn State Univerity	WEF Nexus decision support	SEI	https://ecosystems.psu.edu/directory/cvs6145
Rodriguez	Luz	Javeriana University	Rural sociology	SEI	https://fear.javeriana.edu.co/w/luz-angela-rodriguez-ramirez-profesora?redirect=%2Fprofesores%2F
Rey	Lola	JRC	Hydro-economic modelling, economic instruments, water-food-	UoM	

			energy-nexus		
Garrick	Dustin	U. Waterloo	Water allocation policy, trading systems		
Deines	Jill	Pacific Northwest National Lab	Water management, remote sensing of land and water		
Siegfried	Tobias	Hydrosolutions	Working in private sector on many of the same types of tools and approaches we are proposing for modelling and monitoring		
Hanemann	Michael	Arizona State University	Economic and allocation instruments	All	SC to determine eligibility. Otherwise amendment to budget will be needed to ensure the project can fund travel expenses of APs.
Kumar	Dinesh	IRAP	Hydroeconomic modeling	All	SC to determine eligibility. Otherwise amendment to budget will be needed to ensure the project can fund travel expenses of APs.

5.5. Contingency planning

We are aware that although TRANSCEND has been meticulously designed, a series of unfavorable events or issues may delay the implementation of the project's activities or lead to only a partial realization of the envisaged impacts. Our risk and contingency strategy addresses the imaginable circumstances that may lead to these results, and contains preventive and corrective actions. Risk management and contingency planning activities will be carried out throughout the project implementation to ensure that the project strategy, tasks, results, and budget remain on track. Contingency risk management (Task T7.2) will be continuously monitored and assessed by the SC (every 4 months) and the MB (every year), and the risk

strategy will be periodically revised in Deliverables D7.3 to D7.6. The contingency risk management permeates all management tasks, including quality assurance, ethics, data and IPR management and monitoring of the project's progress. We will monitor and address operational risks relating to the quality of the results and critical delays in implementing the mutually dependent activities; budgetary risks relating to under- and over-spending; competence risks relating to expertise required to produce the results, manage the project, and communicate and disseminate the results; and challenges arising from external policy and institutional changes.

Table 9: Critical risks for implementation

Risk description (Likelihood & Severity)	**WP(s)**	**Proposed risk-mitigation measures**
Mobility restrictions (**L high, S medium**, very well managed)	WP2,6 & indirectly all WPs	• Online **Virtual Forum** (website, mobile app) encompassing all project communication channels, access to workshops and meetings; • Stakeholders and partners under mobility restrictions will participate in workshops and meetings through the Virtual Forum; • Local workshops can be postponed up to 4 months in the event of mobility restrictions; after this period workshops held online; • Large meeting rooms to keep social distancing; well-designed and empirically tested COVID-19 protocols will be enforced; • General assemblies can be relocated following mobility restrictions; • Remote access to key infrastructures available (e.g. supercomputer).
Weak, inconsistent or unbalanced stakeholder engagement (**L low, S high,** well managed)	WP1,2,6 & indirectly all WPs	• Key expertise in stakeholder-driven co-creation (see Section 3.2); • Continued & efficient online meetings, periodic in-person meetings; • WP1 continuously monitors & enhances stakeholder engagement, including Impact Champions and integration of stakeholder needs (T1.6).
Policy instability and institutional paralysis interrupt and/or delay co-creation in labs, such as Orontes, Mahanadi and Caplina-Mauri-	WP2 & indirectly all WPs	• Engagement of crisis-resilient informal (i.e. non-institutionalized) stakeholders (e.g. farmer communities) on top of formal ones; • Institutions represented by a knowledgeable civil servant, on top of a policy representative, to ensure continuity; • Explore informal TAP (e.g. mutual funds, voluntary reallocation, quotas);

Risk description (Likelihood & Severity)	**WP(s)**	**Proposed risk-mitigation measures**
Desaguadero (**L medium, S high,** well managed)		• Tested contingency planning & successfully implemented int'l projects, including during periods of civil disorder (AUB, SEI, IRAP); • Local network manager and scientific coordinator in labs for effective monitoring and knowledgeable management
Socioeconomic and ecological value of TAP either low or inconclusive (**L low, S medium,** and avertable)	WP2,5	• Preliminary TAP carefully chosen, building upon previous research, stakeholder feedback and thorough assessment; • Co-design TAP and identify and address what genuine public policy concerns prevent the adoption of TAP; • Meticulous analysis of barriers and how to overcome them (WP5).
Deep uncertainty prevents consensus (**L low, S high,** very well managed)	WP2,5 & indirectly WP6	• Clear expectations and awareness established from the beginning; • Talanoa dialogue for constructive and empathic engagement; • Experimental learning towards effective co-creation in *scenathons*; • Mechanistic models and heuristics used to inform decision-making.
Data quality and gaps (**L very low, S medium,** and addressed)	WP3,4 & indirectly WP2	• *Ex-ante* data availability checks already conducted in labs; • Stakeholders in labs agreed to make relevant data available; • Several models for the suite already validated in labs by partners; • Modular approach allows replacing models.
Inadequate integration of interdisciplinary methods, indefensible results (**L low, S high,** and addressed)	WP3,4 & indirectly WP2, 5-6	• Modular approach tested in key initiatives (CMIP6, ISIMIP) provides flexibility to link systems; • Key expertise on socio-ecological and ensemble modeling by partners; • Internal and external review mechanism; • Use of labs DSS fosters understanding, advocacy and acceptance of results.
Exit of a key partner (**L and S very low** and manageable)	All WPs	• Thematic areas covered by 3+ partners with excellent skills, which makes it possible to replace a partner without a significant risk for the achievement of the project objectives (see Annex I).
Changes in the HE status of UK partners	All WPs	• **The risk "changes in the HE status of UK partners" already realized during the signature of the Grant Agreement. We rely on UK's financial safety net mechanism to fund the expenses of UoM during the project. This signed commitment to fully fund UK partners costs has already been received by UoM from UKRI.**

We consider as low other imaginable management and implementation risks, reduced to the minimal level by the well-organized and structured procedures and rules. Nevertheless, the contingency risk will be periodically reviewed under the task T6.3.

5.6. Other organizational and practical arrangements

Several other organizational and practical arrangements have been made among the parties during the first 2 months of the project, including during the Kick-off meeting (see Annex II), which are summarized below.

- **Six-month financial reporting, risk reporting, dissemination reporting, and impact reporting**. It is agreed that all parties will provide every six months 1) financial reports, 2) risk reports, 3) dissemination reports, and 4) impact reports. The excel templates that will be used for financial, risk, and dissemination reporting (1-3) are available in Annex III and will be made available to all partners in the cloud drive after it is created. The adoption of these templates for the purpose of reporting has been agreed by all participants in the kick-off meeting. The interval between reporting periods may be extended after year 1 and up to a 12 month-reporting period provided reporting is smoothly implemented and no major reporting contingencies arise.

The template for impact reporting will be developed by USAL and FTC and sent to other partners no later than month 6. The template will be accompanied by a spreadsheet allocating monitoring tasks for Outcomes and Impacts (see Figure 5).

- **Communication platform: virtual forum, logo, Twitter & Facebook, one drive, calendar.** The Virtual Forum will de ready for month 3, and will include a website with a mobile interface to ensure correct visualization across different platforms and devices. The Twitter (username: **@TRANSCEND_H_eu**) and Facebook (username: **TRANSCEND HorizonEurope**) accounts of the project were created and will be managed by the coordinator. The brochure and leaflet will be prepared by the coordinator with support from ARPAE by month 7 (ahead of the first round of workshops), and shared among partners. The first project video will be commissioned to be ready ahead of month 8 as well. The logo design was commissioned to a company following a public tender and different options were presented to assistants to the meeting, among which the logo below was chosen.

Figure 6: Project logo

Partners also discussed on the cloud drive services that would be used for collaborative work among scientific partners to develop the tasks foreseen in TRANSCEND. Partners of the Consortium have been using Google cloud drive services (Google Drive) in previous projects; however, as noted by the Coordinator, this service is not compliant with the EU Regulation 2016/679 on General Data Protection Regulation, in the current version of the OJ L 119, 04.05.2016; cor. OJ L 127, 23.5.2018. This is because since the General Data Protection Regulation establishes that no personal data can ever leave the EU, and Google's servers are in the US, any information in the project uploaded to Google Drive that includes names, addresses, contract information, etc. would not comply with General Data Protection Regulation. Google Drive encrypts data in transit, then decrypts it in the US, and encrypts it when at rest, which means Google can access data on its servers whenever it wants to, and hand it over to US authorities following lawful access requests based on the CLOUD Act or Patriot Act. In these cases, Google or US law enforcement could access EU citizens' personal data, outside the EU.

This problem can be sorted out paying for data residency options in Google's Enterprise-tier workspace, or encrypting files before upload, as the GDPR highlight end-to-end encryption as a viable safeguard against data leaks. Nevertheless, per-file encryption would severely constrain the information flow within the project (also Google constrains the amount of encrypted storage in their servers), and Google's Enterprise-tier workspace has a cost that has not been budgeted in the project. In this context, partners agreed to switch to Microsoft One Drive as an alternative solution that is compliant with General Data Protection Regulation. The TRANSCEND One Drive will be hosted by USAL and managed by the PM and PGC. The One Drive will be ready by month 3.

6. Roadmap, including roles and responsibilities of each partner

6.1. Synthesis Roadmap

Figure 7 provides an overview of the work packages, tasks, milestones, and deliverables of the TRANSCEND Project, its delivery date, and the lead partner. A project calendar has been created and shared with all consortium partners indicating deliverables, milestones, and MB and SC meetings, to ensure a fluent workflow. The calendar will be periodically updated to keep up to date all the relevant events (e.g., project events such as science-policy workshops) and deadlines. The calendar will be shared with stakeholders in knowledge networks and the EAB and made publicly available in the Virtual Forum in month 3.

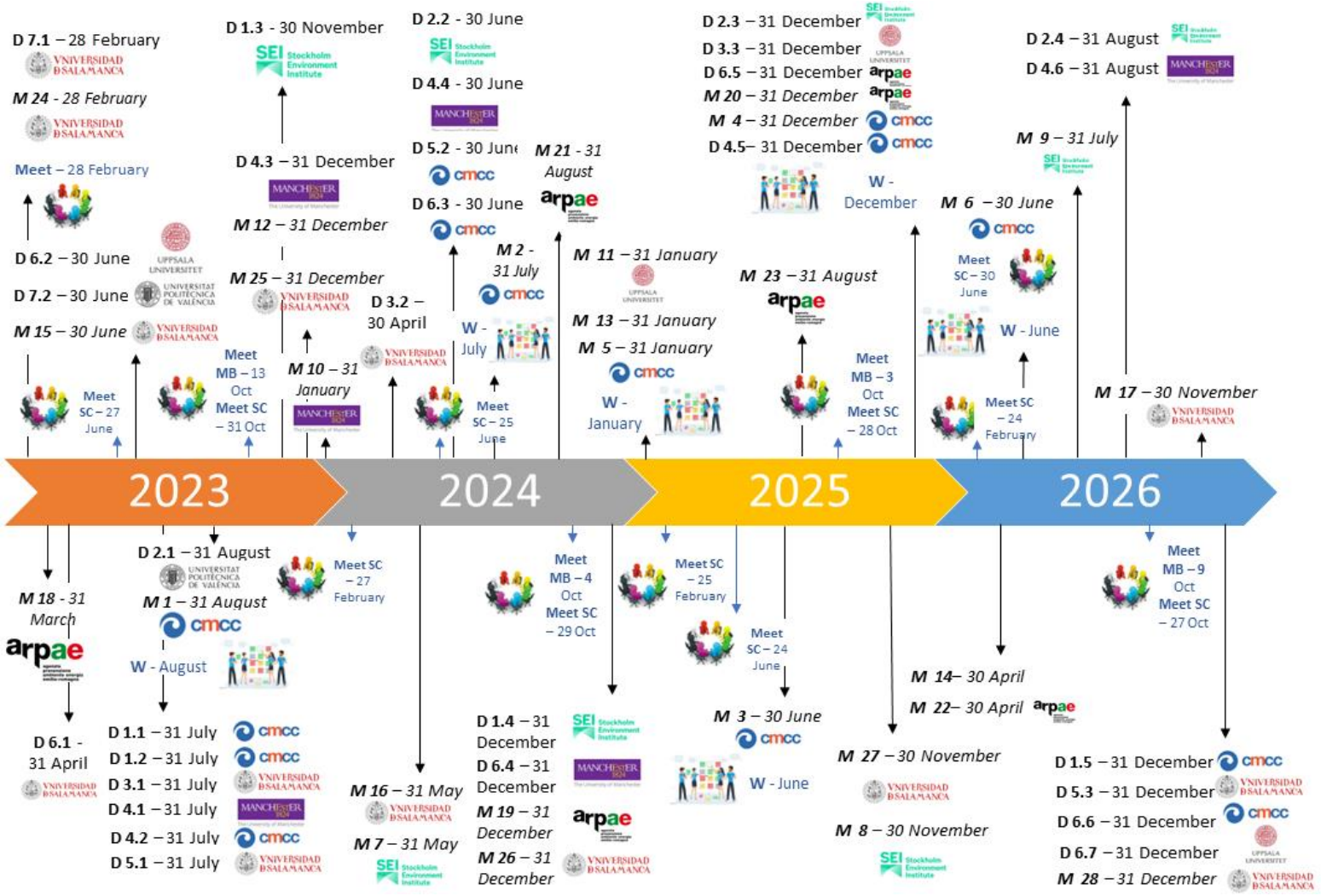

Figure 7: Synthesis Roadmap. Legend: D: Deliverables (with logo of leading institution); M: Milestones; W: Workshops.

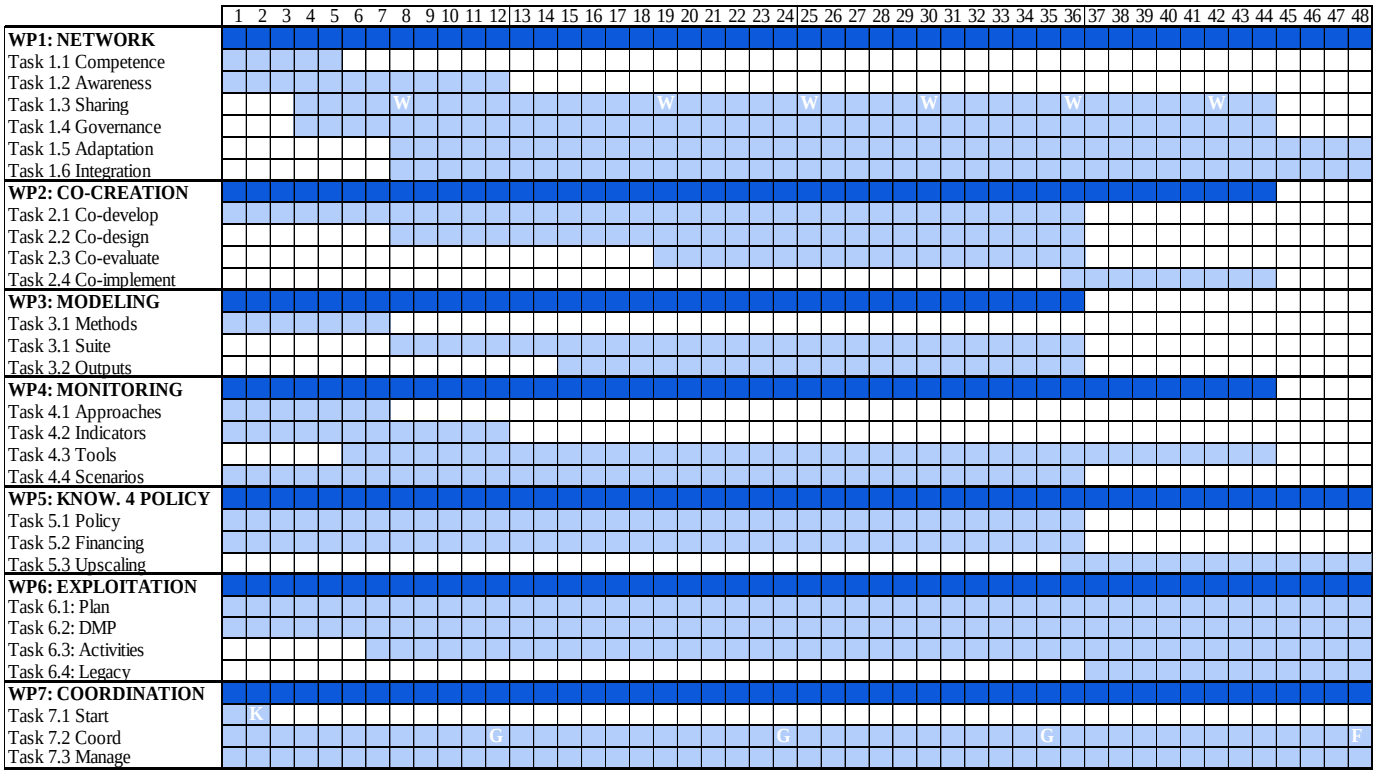

Figure 8: Gantt chart. Legend: D: Deliverables; M: Milestones; W: Workshops.

6.2. Work packages

The project is structured in four thematic work packages that develop the three pillars of the ecosystem of innovation (WP1, 3, 4) and its application in living labs (WP2); complemented by Knowledge for Policy (WP5), Exploitation, dissemination and communication (WP6) and Coordination and management (WP7):

Table 10: List of work packages

WP	Work Package Title	Lead	Lead short	PMs	Start	End
WP1	NETWORK: Strategic guidance of Knowledge Networks	2	CMCC	101	1	48
WP2	CO-CREATION: Co-creation in labs	6	SEI	136	1	44
WP3	MODELING: Actionable modeling suite	3	UU	136	1	36
WP4	MONITORING: Monitoring, accounting & scenarios	7	UoM	81	1	44
WP5	KNOWLEDGE 4 POLICY: Governance, policy and financial mechanisms for TAP adoption & upscaling	1	USAL	68	1	48
WP6	EXPLOITATION: Exploitation, dissemination & communication	8	ARPAE	102	1	48
WP7	COORDINATION	1	USAL	54	1	48
			Total PMs	678		

WP1 (NETWORK – *Strategic guidance of Knowledge Networks*) is the project's vehicle for stakeholder engagement, collaboration, knowledge sharing and mutual learning in knowledge networks.

Table 11: WP1 - Roles, responsibilities and resources

Work package number	**WP1**	**Lead beneficiary**				**CMCC**		
Work package title	**NETWORKS** (*lead*: CMCC/J. Mysiak, *co-lead*: SEI/A. Moncada							
Participant number	1	**2**	3	4	5	6	7	8
Short name of participant	USAL	**CMCC**	UU	FTC	UPV	SEI	UoM	ARPAE
Person/month per participant:	10	**14**	4	1	10	12	9	8
Participant number	9	10	11	12	13	14	15	
Short name of participant	SAŽP	SEVEN	AUB	KRI	SVP	IRAP	ASU	
Person/month per participant:	11	8	7	7	0	0	0	
Start month	M1		**End month**		M48			

Objectives
(1) Initiate and manage the knowledge networks that will enable stakeholders to contribute to co-creation process;
(2) Design, facilitate and guide stakeholder engagement and science-policy interactions, so as to stimulate knowledge exchange, peer learning, partnerships, consensus building, and adoption of TAP.

Description of work: WP1 will initiate and manage 7 local & regional knowledge networks, one in each lab; and a horizontal network ('network of networks') connecting the key partners & stakeholders across the labs. The WP will stimulate exchange of knowledge among peers, enhance capability and adaptive efficiency, and organize safe collaboration and experimentation spaces. WP1 will methodologically guide and oversee co-creation in WP2, and identify and *address* gaps and barriers hampering stakeholder engagement in knowledge networks.
TASK 1.1 COMPETENCE: Understanding of context and relational competence (months 1-5) (*lead*: **CMCC,** *co-lead*: **SEI,** *contributors:* ARPAE, UoM, SAŽP, UPV, AUB, KRI). This task will map the complementary knowledge, expertise and skills that enable mutually beneficial knowledge sharing and co-creation. We will map stakeholders and identify their competences; assess strategic complementarities and synergies; invite new stakeholders to join; and establish the knowledge networks that will carry out co-creation processes in WP2.
TASK 1.2 AWARENESS: Awareness raising (months 1-12) (*lead*: **SEI,** *co-lead*: **CMCC,** *contributors:* UU, ARPAE, UoM, SAŽP, SEVEN, USAL). This task will design and implement strategies to build awareness on the benefits and opportunities for value-added co-creation in knowledge networks. Awareness raising activities will be articulated through training events (see Section 2.2.1). Where appropriate, we will implement debiasing and debunking exercises to address misinformation. The purpose of this task is to enhance stakeholders' willingness to engage in knowledge co-creation, and prepare stakeholders for the

information and data that will be conveyed in science-policy exchanges in WP2.

TASK 1.3 SHARING: Knowledge sharing (months 4-44) (*lead*: **SEI**, *co-lead*: **CMCC,** *contributors:* FTC, ARPAE, UoM, SAŽP, UPV, KRI, USAL). This task will define and organize the *spaces* where relational competences are shared and utilized. This includes defining the structure of workshops and meetings, and organizing stakeholder and science-policy interactions in *scenathons*. The objective is to develop fruitful knowledge sharing spaces that stimulate the co-creation of transformational concepts and ideas, and catalyze TAP design, assessment and implementation in WP2.

TASK 1.4 GOVERNANCE: Rules of Engagement and governance bodies (months 4-44) (*lead*: **CMCC**, *co-lead*: **USAL,** *contributors*: SEI, UU, FTC, ARPAE, UoM, SAŽP, UPV, AUB, KRI). This task will define clear Rules of Engagement building on the UNFCCC's Talanoa Dialogue; and manage governance bodies in each lab, as well as the international network board or 'network of networks'. The objective is to create and enforce respectful and constructive exchanges throughout the entire co-creation process in WP2. Governance bodies will actively participate in dissemination, exploitation and communication activities in T6.1.

TASK 1.5 ADAPTATION: Adaptive efficiency (months 8-48) (*lead*: **USAL,** *co-lead*: **UPV,** *contributors:* CMCC, ARPAE, UoM, KRI, SAŽP). This task will assess and enhance the ability of knowledge networks and institutions to learn from and adapt to changes in the climatic, scientific, technological and policy landscape. The task will build on inputs from co-creation activities (WP2) and transaction costs monitoring (input from T4.3) to assess the adaptive performance of knowledge networks; and identify and stimulate the development of dynamic capabilities that can lead to adaptive efficiency and improvement and growth in innovations (TAP). This task will foster lasting and adaptive TAP (WP2) and inform the legacy strategy (T6.4).

TASK 1.6 INTEGRATION: Integration of stakeholder needs and recommendations (months 8-48) (*lead*: **ARPAE**, *co-lead*: **CMCC,** *contributors*: SEI, UoM, SAŽP, UPV, AUB, SEVEN, USAL). This task will build on the applied co-creation exercises in WP2 to identify gaps and barriers hampering stakeholder engagement in knowledge networks, and fine-tune methods in T1.1-5. We will continuously monitor stakeholder engagement through *Impact Champions* (e.g., on gender balance, see Section 1.2.5); gather feedback from stakeholders; and ensure that the project team takes into account and responds adequately to stakeholder recommendations. The impact champion team will meet online 3 months before and 1 month after each workshop to chart progress.

WP2 (CO-CREATION – *Co-creation in labs*) will design and implement robust TAP in labs through co-creation.

Table 12: WP2 - Roles, responsibilities and resources

Work package number	**WP2**	**Lead beneficiary**				**SEI**		
Work package title	**CO-CREATION** (*lead*: SEI/A. Moncada, *co-lead*: UPV/M. Pulido-Velázquez)							
Participant number	1	2	3	4	5	**6**	7	8
Short name of participant	USAL	CMCC	UU	FTC	UPV	**SEI**	UoM	ARPAE
Person/month per participant:	10	10	10	1	17	**21**	10	9
Participant number	9	10	11	12	13	14	15	

Short name of participant	SAŽP	SEVEN	AUB	KRI	SVP	IRAP	ASU
Person/month per participant:	12	9	8	10	3	5	1
Start month	M1		**End month**		M44		

Objectives

(1) Design and implement 7 robust TAP (one per lab) to water scarcity and climate change under deep uncertainty;

(2) Develop partnerships that create and operationalize novel financing mechanisms;

(3) Design and demonstrate institutional and technical feasibility and performance of a transition towards sustainable and inclusive growth in 7 water-scarce labs under deep uncertainty.

Description of work: WP2 is dedicated to the design and implementation of robust TAP in labs. In each lab, we will run 3 'stock-taking' co-creation iterations in which stakeholders and scientists co-design scenarios and TAP, co-develop modeling efforts, and co-evaluate TAP performance (T2.1-2.3). Based on this iterative process, we will co-identify and co-implement one robust TAP in each lab (T2.4). Work in local labs will be supported by cross-fertilization across labs through knowledge sharing activities in international workshops and webstivals.

TASK 2.1 CO-DEVELOPMENT: Co-development of modeling suite (months 1-36) (*lead*: **UPV**, *co-lead*: **UU**, *contributors:* CMCC, SEI, ARPAE, UoM, IRAP, AUB, USAL, SEVEN, KRI, SAŽP, SVP). Building on inputs from the review on socio-ecological and ensemble modeling in T3.1, stakeholders and scientists will identify the relevant systems in each lab (including climatic, hydrologic, agricultural, and micro- and macro-economic systems, as well as other relevant systems), the key relationships between them, and the systems' models that will populate the ensemble. The upshot will be the *blueprints* of an actionable modeling suite for each lab. Building upon these blueprints and follow-up stakeholder feedback during co-creation iterations, scientists will develop, calibrate and validate the modeling suite in T3.2.

TASK 2.2 CO-DESIGN: Co-design of TAP and scenarios (months 8-36) (*lead*: **USAL**, *co-lead*: **SEI**, *contributors:* all). In this task, stakeholders and scientists will *co-design* TAP and scenarios. The co-design of TAP will build on inputs from the white papers and policy briefs on governance (T5.1) and financing mechanisms (T5.2) for TAP; while the co-design of scenarios will build on the tailored climate and socioeconomic scenarios by lab developed in T4.4. TAP and scenarios will be used as inputs to run simulations with the modeling suite in T3.3. Simulation results from T3.3 will be used in turn to fine-tune TAP and scenarios over three iterations.

TASK 2.3 CO-EVALUATION: Co-evaluation of TAP performance (months 19-36) (*lead*: **SEI**, *co-lead*: **UPV**, *contributors:* CMCC, ARPAE, UoM, IRAP, AUB, USAL, SEVEN, KRI, SAŽP). We will combine the mechanistic modeling outputs from the modeling suite simulations (T3.3) with heuristics and inductive reasoning (leveraging on stakeholders' expertise to speculate upon the consequences of a given TAP) to co-evaluate TAP performance in labs. We will seek vulnerabilities and tradeoffs in TAP performance; and address them by iteratively revising TAP design in T2.2. We will also explore new scenarios (T2.2) and revise the blueprint (T2.1) as new information is made available. This 'stock-taking' co-creation process will take place over 3 iterations, which will lead to a number of candidate TAP in each lab.

TASK 2.4 CO-IDENTIFICATION & CO-IMPLEMENTATION: Co-identification and co-implementation of robust TAP on the ground (months 36-44) (*lead*: **UoM**, *co-lead*: **SEI**, *contributors:*

CMCC, ARPAE, UPV, IRAP, AUB, USAL, SEVEN, KRI, SVP, SAŽP). For each lab, we will *co-identify* among the candidate TAP in T2.3 the one with the highest potential in terms of i) robustness and ii) contribution to equitable and sustainable economic and welfare growth; and co-implement this robust TAP on the ground. This includes the operationalization of partnerships and novel financing mechanisms to secure sustainable investment into TAP; as well as measures to address regulatory, bureaucratic, policy and other obstacles that may emerge during TAP implementation. We will attentively monitor early TAP performance building on inputs from monitoring toolkits developed in T4.3, recognize risks and limitations, and issue a timely response to such contingencies. Outcomes from T2.4 will be a critical input for upscaling (T5.3) and legacy (T6.4) activities.

WP3 (MODELING – *Actionable modeling suite*) will develop the modeling suite and quantify the cascading impacts and uncertainties of TAP across socioeconomic and ecological systems.

Table 13: WP3 - Roles, responsibilities and resources

Work package number	**WP3**	**Lead beneficiary**				**UU**		
Work package title	**MODELING** (*lead*: UU/G. di Baldassarre, *co-lead*: USAL/C.D. Pérez-Blanco)							
Participant number	1	2	3	4	5	6	7	8
Short name of participant	USAL	CMCC	UU	FTC	UPV	SEI	UoM	ARPAE
Person/month per participant:	22	12	**24**	0	13	12	17	3
Participant number	9	10	11	12	13	14	15	
Short name of participant	SAŽP	SEVEN	AUB	KRI	SVP	IRAP	ASU	
Person/month per participant:	4	11	3	9	3	3	0	
Start month	M1		**End month**		M36			

Objectives
(1) Develop shared interdisciplinary understanding of current state of socio-ecological modeling under deep uncertainty;
(2) Develop one actionable modeling suite by lab;
(3) Apply the modeling suites to evaluate quantitatively the performance of alternative TAP in each lab.

Description of work: WP3 will develop and refine 7 modeling suites, one per lab, to inform TAP design and evaluation. Modeling suites will be applied to assess impacts of TAP under alternative scenarios and setups of the suite, so as to identify TAP that deliver robust performance under deep uncertainty.
TASK 3.1 METHODS: Socio-ecological models and methods for assessing policy performance under deep uncertainty (months 1-7) (*lead*: **USAL**, *co-lead*: **UU**, *contributors:* UoM, SEI, CMCC, IRAP, UPV, SEVEN). This task will conduct a desk review of methods and models for assessing the socioeconomic and ecological impacts of policies under deep uncertainty. This will include a critical assessment of existing protocols for the interconnection of socioeconomic and ecological systems (*two-way feedbacks*); and of the models and techniques used in cutting-edge ensemble experiments (such as CMIP and ISIMIP).

This task will also examine how socio-ecological models can be better integrated with ensemble forecasting methods. The desk review will be synthesized into a *white paper* describing available models and methods, and their key strengths and weaknesses and barriers for adoption. This task will inform the co-development of the *blueprints* of the modeling suite in T2.1.

TASK 3.2 SUITE: Actionable modeling suite (months 8-36) (*lead*: **UU**, *co-lead*: **UoM**, *contributors:* USAL, UPV, SEI, CMCC, ARPAE, SEVEN, KRI, SVP, AUB, IRAP). Building upon the *blueprints* co-developed alongside stakeholders in T2.1, this task will assemble, calibrate, and validate an actionable modeling suite in each lab using a protocol-based modular approach. Modularity means that models at each system level will be run independently in modules; and then connected through sets of bidirectional protocols, which are defined as rules designed to manage interrelationships among systems' modules (i.e. two-way feedbacks). Each module will be populated with multiple models of climatic (CMIP6 and downscaled projections in CORDEX), hydrologic (i.a. SUMMA, VIC, HBV, GR4J), agricultural (i.a. AquaCrop-OS, DSSAT, APSIM, WOFOST), microeconomic (econometric and mathematical programming models such as PMP, PMAUP, LP) and macroeconomic systems (CMCC, USAL & UoM input-output and computable general equilibrium models, e.g. ICES); as well as models of other relevant systems (see e.g. CMIP6, ISIMIP, as well as water quality and ecological models to explore pollution-related problems in labs such as the Nitra RB) identified during co-development. Protocols for the interconnection of modules will be implemented using established open-source programming and frameworks to further enhance and support scalability (e.g. OpenMI standard). Leveraging data provided by the water accounting and monitoring toolbox developed in T4.3, we will parameterize, calibrate and validate the modeling suite in each lab. The upshot will be 7 actionable modeling suites (one per lab) that can be readily used to formulate and address locally relevant problems. We will periodically update the modeling suites to rigorously address the needs for improvement identified by stakeholders in T2.1. The suite will be used to run simulations on TAP performance in T3.3.

TASK 3.3 OUTPUTS: Modeling TAP performance and uncertainties (months 15-36) (*lead*: **UU**, *co-lead*: **UoM**, *contributors:* USAL, UPV, SEI, CMCC, SEVEN, KRI, SAŽP, AUB). This task will apply the modeling suite in T3.2 to quantify the performance of TAP under a range of potential future scenarios (T2.2). We will produce, for each lab and over time, projections and uncertainty bounds of: i) relevant stressors from climatic changes, ii) quantitative and qualitative status of surface and groundwater bodies, iii) ecological impacts on key ecosystems and ecosystem services; iv) socioeconomic impacts on water users, v) wider macroeconomic impacts (e.g. agro-industry), and vi) other key variables identified by stakeholders. We will simulate alternative TAP (including alternative combinations and sequencing of policies), scenarios and initial states (*multi-scenario*), using alternative setups of the modeling suite (*multi-system, multi-model*). In doing so, simulation outputs will support the evaluation and identification of robust TAP that address critical vulnerabilities and tipping points, including risks of ecosystem collapse and socio-economic conflict (input for T2.3-4).

WP4 (MONITORING) will design and populate an interactive water accounting and impact assessment toolbox to monitor TAP performance against key indicators, and build climate and socio-economic scenarios.

Table 14: WP4 - Roles, responsibilities and resources

Work package number	WP4	Lead beneficiary				UoM	
Work package title	**MONITORING** (*lead*: UoM/T.Foster, *co-lead*: UPV/M.Pulido-Velázquez)						
Participant number	1	2	3	4	5	6	**7**	8
Short name of participant	USAL	CMCC	UU	FTC	UPV	SEI	**UoM**	ARPAE
Person/month per participant:	7	4	2	0	12	5	**17**	4
Participant number	9	10	11	12	13	14	15	
Short name of participant	SAŽP	SEVEN	AUB	KRI	SVP	IRAP	ASU	
Person/month per participant:	6	9	4	6	2	3	0	
Start month	M1		**End month**		M44			

Objectives

(1) Document approaches, challenges and opportunities for monitoring, enforcement and control in the implementation of TAP, including issues of illegal water use and ex-post learning and evaluation;

(2) Develop a database of performance indicators to support monitoring and implementation of TAP in labs;

(3) Design and populate an interactive water accounting and impact assessment toolbox to enable stakeholders in each lab to objectively monitor TAP performance against key indicators;

(4) Construct plausible future climate and socio-economic development scenarios, including monitoring and enforcement capacity, tailored to each lab.

Description of work: WP4 will identify the critical information and data needs to enable stakeholders to monitor, appraise, and enforce TAP in labs. The WP will critically review and document existing monitoring and enforcement approaches and their performance, determine decision-relevant indicator variables and metrics for user-prioritized TAP, and construct an interactive monitoring and accounting toolbox; and design future scenarios to inform TAP design and evaluation.

TASK 4.1 APPROACHES: Monitoring and enforcement approaches (months 1-7) (*lead*: **UoM**, *co-lead*: **UPV**, contributors: USAL, SEI, ARPAE, SEVEN, KRI, IRAP, AUB, SAŽP, SVP). This task will critically review the approaches taken to monitoring and enforcing performance and outcomes of water policies in labs and other regions globally. Through desk literature surveys and dive case studies, the review will provide a state-of-the-art overview of how regulators ensure compliance with, and enforcement of, policy objectives, including challenges associated with illegal water use and learning from ex-post policy outcomes. Lessons and opportunities for strengthening implementation of TAP through refinements to policy design and monitoring (including via use of novel data systems and resources such as Copernicus) will be identified and documented. This task will be used as an input for T4.2 and T4.3.

TASK 4.2 INDICATORS: Monitoring indicators (months 1-12) (*lead:* **UoM,** *co-lead:* **SEVEN**, *contributors*: SEI, UPV, USAL, IRAP, ARPAE, AUB, KRI, SAŽP)**.** This task will identify and define the key indicators of water use, water availability, water-related impacts (both socio-economic and environmental), and institutional performance (including transaction costs) that are needed to support the design, evaluation, implementation, and enforcement of TAP. In consultation with stakeholders, information will be synthesized about the types and status of existing monitoring infrastructure (e.g. water metering, surface/groundwater gauging, socio-economic surveys, etc.) and data systems (e.g. water rights

inventories, land cover mapping) that can support TAP design and performance evaluation. Building on inputs from the review of monitoring approaches in T4.1, an inventory of key data gaps and monitoring deficiencies will be identified and developed across labs, including known water challenges such as illegal abstractions.

TASK 4.3 TOOLS: Monitoring tools (months 6-44) (*lead:* **UoM,** *co-lead:* **UPV**, *contributors*: SEVEN, AUB, USAL)**:** This task will design, develop, and implement an innovative data-driven water accounting and impact assessment toolbox that will support TAP co-implementation (T2.4) in labs, along with supporting parameterization, calibration and validation of socio-ecological models (T3.2). By assimilating and integrating data from a range of currently disparate sources, including local monitoring, regional and global datasets, and earth observation products, the toolbox will enable stakeholders to track performance of TAP and their socio-economic impacts across sectors, space and time addressing priority data needs (T4.2) and gaps in existing monitoring infrastructure (T4.1). The toolbox will be fully open-source and built around established open data resources (including Copernicus archives) and water accounting methods (e.g., FAO's Water Accounting Plus (WA+) framework) to ensure monitoring of TAP options and outcomes is objective and transparent, and able to continuously evolve over time. Design of the toolbox will be tailored to the needs of lab stakeholders building on co-creation processes in WP2, with an interactive web-based visualization dashboard provided to enable rapid and flexible access to the toolbox and underlying data during and beyond the project.

TASK 4.4 SCENARIOS: Climate and socioeconomic scenarios (months 1-36) (*lead*: **CMCC**, *co-lead*: **UoM**, *contributors:* UPV, SEI, ARPAE, SEVEN, UU)**:** This task will draw upon future global and regional climate, land use and socioeconomic projections (including CMIP6, ISIMIP, LUMIP) and observed historic lab development trajectories to develop bias corrected and downscaled climate, land use and socioeconomic scenarios for each lab. These scenarios will be further tailored to each lab through co-design (T2.2), considering emerging information on trajectories of natural-human systems (e.g., land use changes) from monitoring tools and data (T4.3). As part of scenario co-design, socio-economic scenarios for TAP analysis will consider alternative strategies and pathways for monitoring, enforcement, and compliance control of TAP. This will ensure scenario analysis provides a realistic picture of expected TAP performance and robustness given variable capacities and costs of implementation.

WP5 (KNOWLEDGE 4 POLICY) will examine governance, policy and financial enablers and barriers to inform co-creation, and synthesize and upscale co-creation results to inform national and supra-national (e.g. EGD) policies.

Table 15: WP5 - Roles, responsibilities and resources

Work package number	**WP5**	**Lead beneficiary**				**USAL**		
Work package title	**KNOWLEDGE 4 POLICY** (*lead*: USAL/C.D. Pérez-Blanco, *co-lead*: SAŽP/R. Považan)							
Participant number	**1**	2	3	4	5	6	7	8
Short name of participant	**USAL**	CMCC	UU	FTC	UPV	SEI	UoM	ARPAE
Person/month per participant:	**16**	6	0	4	5	5	5	2
Participant number	9	10	11	12	13	14	15	

Short name of participant	SAŽP	SEVEN	AUB	KRI	SVP	IRAP	ASU
Person/month per participant:	15	3	2	4	0	0	1
Start month	M1		**End month**	M48			

Objectives

(1) Document TAP performance and examine governance, policy and financial enablers and barriers for TAP;

(2) Synthesize and upscale the results obtained in labs to inform supra-national (notably EU) and national strategies for water resources management, climate adaptation, disaster risk reduction, sustainable development, and ecosystem protection in the EU and beyond.

Description of work: WP5 will analyze governance, policy and financial barriers and enablers for TAP, and identify good practice and reforms for unlocking the potential of TAP and scaling up. It will produce white papers and targeted policy briefs to support co-creation in labs (WP2); followed by a report on major policy directions for TAP upscaling leveraging on co-creation experiences in labs.

TASK 5.1 POLICY: Governance & policy mechanisms and opportunities for TAP adoption (months 1-36) (*lead*: **USAL**, *co-lead*: **FTC**, *contributors:* CMCC, UPV, SEI, SAŽP, KRI, ASU). We will conduct desk literature surveys (including case studies, demonstration projects, published reports and gray literature), interviews and deep dive case studies to document the performance of economic instruments, water allocation systems, nature-based solutions, digital technologies, non-conventional water sources and resilience instruments; examine governance/policy enablers, as well as opportunities and barriers for TAP adoption; and assess transferability. The purpose is to provide tailored analyses by lab that synthesize the diffuse literature and experience on TAP to render it relevant for TAP co-design in T5.2. Analyses will be revised iteratively building on co-design outcomes (T2.2) and taking into account new information from other ongoing HE projects, Missions and Partnerships (T7.3). TAP analyses will be digested into a white paper and lab-specific policy briefs produced ahead of each workshop.

TASK 5.2 FINANCING: Financing mechanisms to support TAP (months 1-36) (*lead*: **CMCC**, *co-lead*: **UoM**, *contributors:* USAL, SEI, SEVEN, ASU, SAŽP). This task will assess ways to finance TAP costs in an equitable and sustainable manner (just financing). This includes financing mechanisms to smoothen the transition to transformational water pricing policies (such as environmental and resource cost recovery), taking into consideration the opportunities available in various EU and national funding mechanisms and policies. A targeted desktop literature survey will be conducted based on data available in on-line repositories, knowledge networks, academic and gray literature, and interviews. The product will be a 'primer' on the financial materiality of TAP that informs co-design in T2.2. Analyses will be adjusted iteratively building on co-design outcomes (T2.2) and taking into account new information from other ongoing HE projects, Missions and Partnerships (T7.3). Analyses will be digested into a white paper, and lab-specific policy briefs produced ahead of each workshop.

TASK 5.3 UPSCALING: Synthesis and upscaling of key results and recommendations (months: 36-48), *lead*: **USAL**, *co-lead*: **SAŽP**, *contributors:* ARPAE, UoM, FTC, UPV, SEI, KRI, AUB. This task will identify legal, policy, regulatory, financial and technical barriers, and reform options for TAP upscaling in the EU and beyond. The assessment will include (1) qualitative desk-based mapping and interpretive analysis, designed to identify key legal, policy, financial, institutional and monitoring barriers for TAP adoption

building on T5.1-2 and WP4; and (2) in-reach from co-creation with stakeholders in WP2 (notably T2.2 and T2.4), as well as from key expert groups and policy platforms and networks with whom we will engage (T6.3 & T7.3), so as to identify and synthesize stakeholder and expert opinion concerning legal, policy, financial, institutional and monitoring barriers for TAP adoption. Furthermore, we will develop in partnership with these groups a diverse and flexible suite of reform options to address the barriers identified above. The primary but not exclusive focus will be on reform options at national and EU-level, including policy development options available to relevant authorities in their areas of competence. We will mainstream the assessment of TAP barriers and reform options into national and supranational (EGD) adaptation strategies/plans, as well as water resources management, disaster risk reduction, sustainable development, and ecosystem protection strategies. The second international workshop will act as the focal point of stakeholder and expert consultation in this context, complemented with consultations conducted in webstivals and outreach events. All these materials will be developed into a Policy Notebook (D5.3) meant as a guidance for policy and practice.

WP6 (EXPLOIT – *Exploitation, dissemination and communication*) will implement a range of activities enabling an effective exploitation, dissemination and communication of project results.

Table 16: WP6 - Roles, responsibilities and resources

Work package number	**WP6**	**Lead beneficiary**				**ARPAE**		
Work package title	**EXPLOITATION** (*lead*: ARPAE/C. Alessandrini, *co-lead*: CMCC/J. Mysiak)							
Participant number	1	2	3	4	5	6	7	**8**
Short name of participant	USAL	CMCC	UU	FTC	UPV	SEI	UoM	**ARPAE**
Person/month per participant:	12	12	8	1	7	8	10	**13**
Participant number	9	10	11	12	13	14	15	
Short name of participant	SAŽP	SEVEN	AUB	KRI	SVP	IRAP	ASU	
Person/month per participant:	11	4	4	9	1	1	1	
Start month	M1		**End month**		M48			

Objectives

(1) Design and monitor the Plan for the Dissemination and Exploitation including Communication activities (PDEC); the Data Management Plan (DMP); and the Intellectual Property Rights agreement (IPR);

(2) Design and deploy high-quality and tailored dissemination, exploitation and communication activities;

(3) Ensure sustainable adoption of the ecosystem of innovation in living labs;

(4) Replicate the adoption of the ecosystem of innovation, by establishing inspiration labs across the world that explore robust TAP adoption.

Description of work: WP6 will implement a range of activities enabling an effective exploitation, dissemination, and communication of TRANSCEND methods and results. Together with WP1 and WP2, WP6 will work towards improving awareness of the value added of a knowledgeable deployment of TAP, contributing to its greater uptake. To this end, WP6 will oversee the preparation and implementation of the PDEC, develop and supervise the DMP and the IPR agreement, develop and execute dissemination and outreach strategy, and explore the extension and sustainability of the ecosystem of innovation and its monitoring toolbox and modeling suite through legacy actions.

TASK 6.1 PLAN: Strategic direction of the PDEC and IPR management plan (months 1-48), *lead*: **USAL**, *co-lead*: **ARPAE**, *contributors:* all. This task will develop, oversee and ensure execution (and annual revision) of the project's PDEC and the IPR agreement. We will work closely with lab governance bodies (T1.4) to mobilize stakeholders and engage them in exploitation, dissemination and communication activities, and revise and update the PDEC in our annual reports to take advantage of emerging synergies across and beyond labs. We will develop visual identity, and design and conduct the strategic supervision of the project website and app (*Virtual Forum*) to ensure effective communication and information exchange within and across labs.

TASK 6.2 DMP: Data Management Plan (months 1-48), *lead*: **UU**, *co-lead*: **UoM**, *contributors:* USAL, UPV, AUB, SEVEN, SEI, CMCC, ARPAE, SAŽP. This task will develop and monitor the DMP (D6.2) that defines protocols for collecting, storing and accessing the project's data, including guidelines to make data findable, accessible, interoperable, and re-usable (FAIR) (Section 1.2.7), and open (Section 1.2.6). TRANSCEND will generate large and innovative databases that comprise primary and secondary data (Section 1.2.7), including a groundbreaking *database of plausible futures* (D3.3) that complements major ongoing efforts in the international scientific community to inform decision-makers and society on water resources management and climate change adaptation. Beyond informing co-creation processes in labs, we will work in partnership with CMIP6 and ISIMIP to ensure wide dissemination of this data across scientists and decision-makers. Moreover, we will embed the database of plausible futures into the core functionality of the Water Risk Filter and other major industry platforms, so as to create tailored results that are user- and industry-relevant. These efforts will be instrumental towards achieving a lasting legacy of our results (input to T6.4). All datasets, except for data held sensitive under the EU's data protection law, will be open access via FAO Aquastat, EEA's WISE and Climate Adapt portal, after the completion of all internal quality checks.

TASK 6.3 ACTIVITIES: Tailored dissemination and exploitation activities (months 7-48), *lead*: **ARPAE**, *co-lead*: **CMCC**, *contributors:* all. This task will implement dissemination and exploitation activities laid down in the PDEC and develop high-quality dissemination and exploitation products tailored in content and format to decision-makers, other stakeholders, citizens and the academia, both within and beyond the geographical area of influence of labs (see Table 2.2.c for a list of exploitation and dissemination measures). All partners will be responsible for carrying out actions for the relevant audiences and stakeholders according to their expertise and geographical context, building on the experiences gained through co-creation in labs. The main communication language for all activities and materials will be English, with labs' national and regional languages being used to facilitate stakeholder and citizen engagement. Dissemination and exploitation activities will be designed based on the contributions from all WPs and especially WP2 & 5.

TASK 6.4 LEGACY: Legacy and exploitation beyond the lifespan of the project (months 37-48), *lead*: **CMCC**, *co-lead*: **UoM**, *contributors:* USAL, SEI, ARPAE, SAŽP, KRI. This task will ensure a lasting footprint and preserve the legacy of the project. This will include maintenance of outreach platforms and

knowledge networks, prolonged (if not perpetual) accessibility of the project's outcomes via major open access portals and repositories, and proper management of the IPR beyond the lifespan of the project. We will explore and develop means to ensure the lasting adoption, replication and update of the ecosystem of innovation (including a business plan—D6.5), maintenance of training platforms, and the identification of 8+ "inspiration labs" where we will adopt and initiate the ecosystem of innovation. This task will also design strategies to ensure the dynamic capabilities identified and stimulated in T1.5 are further strengthened into the future, so as to enhance adaptive efficiency in knowledge networks and lasting improvement and growth in innovations/TAP. Our thorough legacy strategy (D6.6) will be designed based on the contributions from all WPs and especially WP1, 2 & 7.

WP7 (COORDINATION) will be devoted to project coordination and management, progress monitoring, periodic review, identification of risk of underachievement and contingency planning, and internal communication.

Table 17: WP7 - Roles, responsibilities and resources

Work package number	**WP7**	**Lead beneficiary**				**USAL**		
Work package title	**COORDINATION** (*lead*: USAL/C.D. Pérez-Blanco, deputy J. Pindado)							
Participant number	**1**	2	3	4	5	6	7	8
Short name of participant	**USAL**	CMCC	UU	FTC	UPV	SEI	UoM	ARPAE
Person/month per participant:	**16**	4	4	1	3	4	4	3
Participant number	9	10	11	12	13	14	15	
Short name of participant	SAŽP	SEVEN	AUB	KRI	SVP	IRAP	ASU	
Person/month per participant:	3	3	3	3	1	1	1	
Start month	M1		**End month**		M48			

Objectives

(1) Ensure rapid initiation of the project activities and set up the management bodies;

(2) Sound, effective and efficient coordination and management of the project, internal communication, performance & impact assessment and management of contingency risks;

(3) Manage areas of special attention and strategic importance, including ethical aspects and equity and collaboration across relevant HE projects, Missions and Partnerships.

Description of work: WP7 will ensure sound legal, contractual, financial, administrative and ethical management, in compliance with the Grant Agreement (GA) and the Consortium Agreement (CA). WP7 includes project coordination and management; impact assessment and progress monitoring; periodic review; identification of risk of underachievement and contingency planning; quality control; communication among the consortium partners and with the EC; coordination of management bodies; and the management of areas of strategic importance. WP7 will also organize all internal meetings, including the annual General Assemblies of the project.

Task 7.1 START: Initial implementation activities (months 1-2) (*lead* **USAL**, *contributors:* all). This task will ensure a well-prepared and smooth start of project activities. This includes conducting the negotiations with the EC and promptly responding to all requests towards signing and implementing the GA; preparation, signature and early implementation of the CA; and preparation of the Inception Report (IR) and roadmap (D7.1). The IR and roadmap will further refine the work plan, specifying in detail the roles and responsibilities of each partner within each task and WP. The period up to the release of the IR will also allow for organizing the kick-off meeting at the premises of the coordinator in Salamanca (month 2) and making operational the project management bodies (see T7.2).

TASK 7.2 COORD: **Coordination, management and performance & impact assessment** (months 1-48) (*lead*: **USAL**, *contributors:* all). This task will cover (1) project coordination and management; (2) periodic review; (3) contingency planning; (4) impact assessments and monitoring of project's objectives; (5) communication with the EC; (6) communication with partners; (7) quality control management, and (8) organization of General Assemblies that will be held at partners' premises in Uppsala (month 12), Heraklion (month 24), Valencia (month 35) and Venice (final project conference, month 48). The project coordinator Dr. Pérez-Blanco will work side-by-side with deputy Dr. Pindado, project manager Mrs Gil-Ingelmo and USAL financial & legal departments, forming a coordination unit that assures strategic guidance and effective implementation of these tasks in collaboration with partners and the project management bodies. The project management bodies include:

-Management Board composed of WP leads and co-leads, will meet online every 3 months to monitor and review the progress and results, conduct quality control (internal review), proactively identify critical risks & challenges, and revise the contingency risk measures.

-Project Steering Committee, a collegial decision-making body composed of one representative from each consortium member, will meet every 6 months to deliberate on strategic choices such as GA/CA amendments.

-External Advisory Board composed of outstanding science, finance and policy experts, will provide advice on scientific direction and impacts, help to identify existing synergies, support impactful exploitation, and conduct quality control (external review, supported by stakeholders as part of our open-science strategy–see Section 1.2.6).

TASK 7.3 MANAGEMENT: Management areas of special attention and strategic importance (months 1-48) (*lead*: **USAL**, *contributors*: CMCC, UU, UPV, SEI, UoM). This task will manage areas of special attention and strategic importance, including:

-Ethics and responsible research and innovation (RRI). We will oversee compliance with principles of ethical conduct, equal opportunities and RRI. This includes ensuring gender balance is pursued and achieved in labs and the Consortium. Collection and treatment of sensible data will be compliant with General Data Protection Regulation rules (2016/679). A thorough screening of any potential concern will be conducted in D7.2 and revised in annual reports (D7.3-D7.6).

-Collaboration with other HE projects, Missions and Partnerships to exploit synergies and avoid redundancies, and contribute jointly to the HE Program objectives and priorities (feeding into all WPs & tasks and especially T5.1-3).

6.3. Deliverables

Table 18: List of Deliverables. Legend: R: report; DAT: Database; S: Software; DMP: Data Management Plan; PU: public

Del. No.	Deliverable name	WP	Lead	Type	Diss. level	Month
D7.1	Inception Report and roadmap	WP7	USAL	R	PU	2
D6.1	Detailed and revised PDEC and IPR strategy	WP6	USAL	R	PU	4
D6.2	Data management plan	WP6	UU	R	PU	6
D7.2	Ethics Management Plan	WP7	UPV	R	PU	6
D1.1	Stakeholder mapping by lab	WP1	CMCC	R	PU	7
D1.2	Rules of Engagement	WP1	CMCC	R	PU	7
D3.1	White paper: methods & models	WP3	USAL	R	PU	7
D4.1	White paper: monitoring & enforcement	WP4	UoM	R	PU	7
D4.2	White paper: socioeconomic scenarios by lab	WP4	CMCC	R	PU	7
D5.1	White paper:governance/policy enablers/barriers	WP5	USAL	R	PU	7
D2.1	Blueprints of the modeling suite by lab	WP2	UPV	R	PU	8
D1.3	Guidance for scenathons	WP1	SEI	R	PU	11
D4.3	Database of TAP monitoring & sourcebook	WP4	UoM	R&DAT	PU	12
D6.3-6	Exploitation, diss. and communication reports	WP6	ARPAE	R	PU	13,25,37,48
D7.3-6	Progress, Impact and Contingency Risk	WP7	USAL	R	PU	13,25,37,48
D2.2-5	Co-creation Reports (I-IV)	WP2	SEI	R	PU	15,24,37,44
D3.2	Modeling suite prototype and sourcebook	WP3	USAL	R&S	PU	16
D4.4	Water accounting & impact assessment toolbox prototype	WP4	UoM	R&S	PU	18
D5.2	White paper: financing mechanisms	WP5	CMCC	R	PU	18
D1.4	Knowledge networks mid-term report	WP1	SEI	R	PU	24
D4.5	Scenarios database & sourcebook	WP4	CMCC	R&DAT	PU	36
D4.6	Populated water accounting and impact assessment toolbox	WP4	UoM	R&DAT	PU	44
D1.5	Knowledge networks final report	WP1	CMCC	R	PU	48
D5.3	Policy notebook	WP5	USAL	R	PU	48

6.4. Milestones

Table 19: List of milestones

No	Milestone name	WP	Due in month	Means of verification
M1.1-4	Annual local workshops	WP1	8,19,30,36	Workshop minutes and video online in

No	Milestone name	WP	Due in month	Means of verification
M1.5-6	International workshops	WP1	25,42	Virtual Forum
M2.1	Draft of reports on co-creation	WP2	14,23,36,43	Presented at workshops; available online
M3.1	Modeling suite - beta version	WP3	13	Online;shared with partners&stakeholders
M3.2	Intermediate database of simulations	WP3	25	Online;shared with partners&stakeholders
M4.1	Toolbox - beta version	WP4	12	Online;shared with partners&stakeholders
M4.2	Intermediate scenarios database	WP4	25	Online;shared with partners&stakeholders
M4.3	Intermediate accounting & impact ass. database	WP4	40	Online;shared with partners&stakeholders
M5.1	Draft white paper: governance	WP5	6	Online;shared with partners&stakeholders
M5.2	Draft white paper: financing	WP5	17	Online;shared with partners&stakeholders
M5.3	Draft Policy Notebook	WP5	47	Online;shared with partners&stakeholders
M6.1	Virtual Forum launched	WP6	3	Online;shared with partners&stakeholders
M6.2	Summer schools	WP6	24, 36	Online (including event video) & shared across partners
M6.3	Citizen-science events	WP6	20,40	Online & shared by partners' social media
M6.4	Business plan draft	WP6	32	Online & shared across partners and stakeholders; included in D6.5
M7.1-5	Kick-off and General Assemblies	WP7	2,12,24,35,48	Meeting reports, minutes and video online

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Annex I: Consortium partners

The TRANSCEND Consortium has unique and unrivaled strengths and expertise for a successful implementation of this project. The highly qualified Consortium is composed of 15 partners with extensive and complementary knowledge, expertise, and experience, distinguished in their respective fields. Each of the thematic areas (see Table A.I.1) is covered by 3+ partners with excellent skills, ensuring sufficient capacity to achieve project objectives also in the event of contingencies. The contribution of various partners has been planned by matching the tasks with the skills needed, while preserving balance of roles, and assigning adequate financial resources to fulfill that role. The Consortium partners are well connected between themselves through past and ongoing collaborations, and will ensure efficiency in coordination, work distribution and resource allocation, and effectiveness in the achievement of objectives, following the carefully designed workplan.

Table A.I.1: Expertise and skills of partners per thematic area

Thematic area	USAL	CMCC	UU	FTC	UPV	SEI	UoM	ARPAE	SAŽP	SEVEN	AUB	KRI	SVP	IRAP	ASU
Awareness raising	***	***	**	**	*	***	**	**	**	**	*	*	*	*	*
Mapping competences	**	***	*	**	**	***	***	***	**	*	**	**	*	*	*
Serious games	***	***	*	**	**	***	*	*	*	*	*	*	*	*	*
Policy dialogue	***	***	**	***	**	***	***	**	***	**	**	***	**	**	**
Adaptive efficiency	***	**	*	*	***	*	***	**	***	**	*	**	*	*	*
Ecological modeling	**	***	***	*	***	***	***	***	**	***	***	**	***	***	*
Socioecon. modeling	***	***	***	*	***	**	***	*	*	**	*	*	*	*	***
Socio-ecol. mod.	***	***	***	*	***	**	***	*	*	**	*	*	*	*	**
Ensemble forecast	***	***	***	*	**	**	**	*	*	*	*	*	*	*	*
DSS	**	**	**	*	***	***	**	***	***	***	**	***	***	***	*
Monitoring & water accounting	**	*	**	*	***	**	***	**	**	***	***	**	**	**	*
Scenario design	***	***	**	**	**	***	***	**	**	**	**			**	*
Policy design	***	***	**	***	***	**	***	***	***	**	*	***	*	***	***
Policy evaluation	***	***	*	***	***	***	***	*	***	***	**	***	*	**	*
Policy implementation	**	**	*	**	**	***	***	*	***	***	**	***	**	***	*
Upscaling & legacy	***	***	*	**	**	**	**	**	***	**	**	**	*	*	**
Training	**	***	***	**	**	***	***	**	**	***	***	*	*	***	*
Online engagement	***	**	**	***	**	***	**	**	**	***	**	*	*	**	***
Event organization	***	***	***	***	***	***	***	***	**	**	***	***	*	***	***
Ethics, gender	***	***	***	**	***	***	***	***	***	***	***	**	**	**	***
Open Science	***	***	***	**	***	**	***	**	**	***	**	*	**	***	***

The Consortium has exceptional expertise in the initiation and management of knowledge networks. We have conducted activities focused on awareness raising, exploiting relational competences, policy dialogue, knowledge sharing and building adaptive efficiency with all key

stakeholders in the labs. SEI, USAL & CMCC frequently engage with stakeholders to enhance their understanding and awareness of uncertainty, including debiasing and debunking efforts to deconstruct misinformation. All partners have expertise in the organization of policy dialogues with stakeholders, including through Talanoa dialogues (USAL) and *scenathons* (notably SEI, CMCC & USAL).

The Consortium has an outstanding and complementary track record of applied socio-ecological modeling, ensemble forecasting and water accounting and monitoring. We are closely linked and actively contribute to major international water- and climate-related modeling assessments and platforms, including ensemble experiments such as CMIP6 and LUMIP, as well as key socio-ecological modeling platforms such as IAHS' Pantha Rei Working Groups and the COMPASS Global Water Assessment, to name but a few. Partners have contributed to major remote sensing and data processing initiatives, including pilot applications of FAO's WA+ framework (AUB). Moreover, partners have developed widely used DSS, which will be used in labs, including WEAP (SEI), AQUATOOL (UPV), TOPKAPI (ARPAE). Acting in a personal capacity, the key experts of the Consortium contribute or lead many socio-ecological, ensemble and monitoring initiatives. As an example of these manifold contributions, Dr. Pérez-Blanco is chair of the Economic Instruments of Water Security Working Group informing COMPASS; Dr Mysiak (CMCC) is member of the UNDRR Science and technology advisory group for Europe (E-STAG) and a member of EEA Scientific Committee; Dr. Foster is member of the FAO's Core Modeling Group; and Dr. di Baldassarre was the Chair of IAHS' Panta Rhei until 2019. Alongside key expertise, partners bring to the Consortium the infrastructures needed to operate the modeling suite and monitoring toolbox, including supercomputers (CMCC, UoM, UU) and remote sensing labs (USAL, UPV, UoM, AUB).

The Consortium has an unrivaled track record of policy support, including via co-creation. Partners are closely linked to major international water- and climate-related policy platforms, such as the UNDRR Sendai Framework for Disaster Risk Reduction, the EC Mission Board on climate adaptation (where Dr. Mysiak has been member and rapporteur), and the European Environment Agency's Topic Centre on impacts, vulnerability and Adaptation (ETC/CCA, coordinated by CMCC since 2011), to mention but a few. Consortium partners are also closely connected to relevant European and national policy developments and networks in the water and climate sector. Partners have supported river basin planning in Europe and elsewhere, including in *all* the living labs, where we support policy assessments through modeling and our scientific work. Partners have also contributed to national and regional climate adaptation strategies and plans (e.g. CMCC & ARPAE coordinated the Italian and Emilia Romagna Climate Adaptation Strategy and Plan, respectively); EU Climate Adaptation Strategy (e.g. through DG CLIMA commissioned review of climate adaptation modeling—SAM-PS); and water policy, including Common Implementation Strategy working groups and the comparative assessment of drought management plans for DG ENV led by FTC. Partners have pioneered the adoption of **open science**, and thoroughly apply open science practices in their day-to-day work and in their projects and initiatives. Partners attentively monitor and ensure observance of ethics and responsible research and innovation, including commitment to gender equality, across all projects, networks and other initiatives in which they participate or have participated.

Annex II: Minutes of the TRANSCEND kick-off meeting

Minutes of the TRANSCEND Kick-Off Meeting

February 15th – 16th, 2023

Salamanca, Spain

Written by: Héctor González López

AGENDA:

Day 1, February 15/02/2023

09.30 – 11.15	**Welcome and introduction**
09.30 – 09.45	Objectives and pillars of the project & meeting *C. Dionisio Pérez Blanco*, Universidad de Salamanca (USAL)
09:45 – 10.30	Introduction of the partners and teams (3' per institution)
10.30 – 11.15	*Coffee break*
11.15 – 14.05	**Pillar 4: The living labs**
Scope and format: Lab coordinators will present the pressures and management challenges of each lab, the TAP to be assessed & updated, and potential collaborations with other labs. 10' presentation followed by 10' min discussion per lab. Keynote presentation opens discussion.	
11.15 – 11.45	**Keynote** - Climate sensitive? water allocation systems and economic instruments *Michael Hanemann*, Arizona State University (ASU)
11.45 – 12.05	Júcar River Basin (RB) in Spain *Manuel Pulido-Velázquez*, Universitat Politècnica de València (UPV)
12.05 – 12.25	Reno RB in Italy *Cinzia Alessandrini*, Agenzia regionale per la prevenzione, l'ambiente e l'energia dell´Emilia-Romagna (ARPAE)
12.25 – 12.45	Tympaki RB in Greece *Marinos Kritsotakis*, Region of Crete (KRI)

12.45 – 13.05	Nitra RB in Slovakia *Radoslav Považan*, Slovak Environment Agency (SAŽP) & *Miroslava Malatincova*, Slovenský Vodohospodársky Podnik (SVP)
13.05 – 13.25	Caplina-Mauri-Desaguadero System in Peru, Chile and Bolivia *Tania Santos*, Stockholm Environment Institute (SEI)
13.25 – 13.45	Orontes RB in Lebanon, Syria and Turkey *Hadi Jaafar*, American University of Beirut (AUB)
13.45 – 14.05	Mahanadi RB in the Indian states of Chhattisgarh and Odisha *Dinesh Kumar*, Institute for Resource Analysis and Policy (IRAP)
14.05 – 15.00	*Lunch*
15.00 – 16.40	**Pillar 1: Knowledge networks**
Scope and format: 10′ presentations followed by 10′ discussion	
15.00 – 15.20	Starting, managing, and maintaining Knowledge Networks *Jaroslav Mysiak*, Centro Euro-Mediterraneo sui Cambiamenti Climatici (CMCC)
15.20 – 15.40	Engaging network managers and other stakeholders through the Talanoa Dialogue *C. Dionisio Pérez Blanco*, USAL
15.40 – 16.00	Serious games and scenathons *Javier Sierra*, USAL
16.20 – 16.40	*Coffee break*
16.40 – 17.40	**Practical arrangements of working together (I): Coordination**
16.40 – 17.00 17.00 – 17.20 17.20 – 17.40	6-month financial reporting, risk reporting, dissemination reporting Communication platform: virtual forum (web & app), logo, Twitter & Facebook, one drive, calendar Internal management: General Assemblies and Project Bodies (Management Board, Steering Committee, High Level External Advisory Board) Interventions by *C. Dionisio Pérez Blanco* (USAL), *Héctor González-López* (USAL), *Cinzia Alessandrini* (ARPAE), *Jaroslav Mysiak* (CMCC), and others
18.00 – 19.30	*Social activity – guided tour across Salamanca city center*
20.30	*Social dinner*

Day 2 February 16/02/2023

09.00 – 11.30	**Pillar 2: Actionable modeling suite**
Scope and format: 10′ presentations followed by 10′ Q&A, and 30′ roundtable discussion	
09.00 – 09.20	Coupling human-water systems for actionable science

	Giuliano di Baldassarre, Uppsala Universitet (UU)
09.20 – 09.40	Coupling human-human systems for actionable science *Francesco Sapino*, USAL
09.40 – 10.00	Soft coupling and protocols through open source programming – the OpenMI standard *Sina Katami*, UU
10.00 – 10.30	Roundtable discussion Moderated by *Tim Foster,* University of Manchester (UoM)
10.30 – 11.00	*Coffee break*
11.00 – 13.00	**Pillar 3: Monitoring and accounting toolbox**
Scope and format: 10′ presentations (keynote 20′) followed by 10′ Q&A, and 30′ roundtable discussion	
11.00 – 11.30	**Keynote** – Establishing fluent and solid collaboration with our "twin" HE project *Jingshui Huang*, *Water Efficient Allocation in a Central Asian Transboundary River Basin* (WE-ACT).
11.30 – 12.00	Monitoring approaches and tools *Tim Foster,* UoM
12.00 – 12.20	Monitoring indicators *Maggie Kossida,* Solutions for the Environment and Engineering (SEVEN)
12.20 – 12.40	Climate and socioeconomic scenarios *Jaroslav Mysiak*, CMCC
12.40 – 13.00	Roundtable discussion Moderated by *Manuel Pulido-Velázquez,* UPV
13.00 – 14.00	*Lunch*
14.00 – 15.00	**Pathways to impact**
14.00 – 14.20	Designing successful pathways to impact – insights from H2020 & HE projects *Guido Schmidt,* FreshThoughts Consulting (FTC)
14.20 – 14.40	TRANSCEND's pathways to impact *C. Dionisio Pérez Blanco* (USAL)
15.00 – 16.00	**Practical arrangements of working together (II): Impact**
15.00 – 15.40	Communication, Dissemination, Impact -Stakeholder events: 28+ workshops, 2 international workshops, 34+ training events, 30 policy briefs ahead of workshops

	-Academic events: 2 summer schools, 12+ webinars, 4+ papers, 45+ outreach events -General public: 14+ local press releases, 14+ citizen science events, 4 webstivals, 14 local citizen panel meetings (1 international meeting) -28+ newsletters, 3+ brochures, 3 video presentations
15.40 – 16.20	Planning the next 12 months
16.20 – 16.30	**Closing and farewell**
16.20 – 16.30	Closing reflection and next steps *C. Dionisio Pérez Blanco*, USAL, and *Roundtable with interventions from all*

Attendants – without any specific order (29)

C.Dionisio Pérez-Blanco (USAL), Francesco Sapino (USAL), Héctor González López (USAL), Javier Sierra Pierna (USAL), Guido Schmidt (FTC), Giuliano Di Baldassarre (UU), Hadi Jaafar (AUB), Adria Rubio Martín (UPV), Eulalia Gómez Martín (UPV), Tania Santos (SEI), David Purkey (SEI), Maggie Kossida (SEVEN), Jaroslav Mysiak (CMCC), Dinesh Kumar (IRAP), Tim Foster (UoM), Rodica Tomozeiu (ARPAE), Cinzia Alessandrinni (ARPAE), Radoslav Povazan (SAŽP), Robert Blasko (SAŽP), Miroslava Malatincova (SVP), Michael Hanemann (ASU), Ben Parkes (UoM), Jeremy Pal (CMCC), Marinos Kritsotakis (KRI), Panos Sourtzinos (SEVEN).

Starting at: 9:39

Welcome and introduction.

Each attendee talks to the colleague by his/her side for 5 min, and then introduces him/her.

After a brief institutional presentation, C. Dionisio Pérez Blanco starts the meeting by presenting the TRANSCEND project and its pillars.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Giuliano Di Baldassarre comments on the impacts of the project and the importance of working not just in "silos" (i.e., each living lab works separately from others) but also working together and building synergies. To this C. Dionisio Perez Blanco replies that a critical aspect is collaborating across WP3-4 (modeling, monitoring) beyond WP1-2.

Jaroslav Mysiak agrees with Giuliano Di Baldassarre's point.

Tim Foster comments on the importance of leveraging on having different case studies to generate actionable knowledge that is also replicable.

Coffee Break

Pillar 4: The living labs

- **Michael Hanemann** presents the historical evolution of California's water markets and the adaptation policies, where modeling has played a crucial role.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Michael Hanemann comments that a critical aspect is to clearly present the risks to decision-makers, and even to "scare" them with plausible and catastrophic futures. Examples from California are provided on how this strategy has provided better results.

- **Adrià Rubio Martín** presents the Spanish case study (Júcar River Basin).

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Guido Schmidt adds that UPV uses its tools for supporting the decision-making in the River Basin Authorities (AQUATOOL). This should give the project some leverage on the stakeholders, albeit influencing policies will be challenging.

- **Cinzia Alessandrini** Presents the Reno River Basin..

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Jaroslav Mysiak adds that Emilia Romagna is one of the most innovative regions in Italy, which should act in favor of mainstreaming transformational adaptation policies. The drought of 2022 has made decision-makers aware of water scarcity challenges and this may favor political changes and the adoption of TAP.

Michael Hanemann adds that in California future scenarios (including streamflow) are forecasted using a probabilistic process. A brief exchange with other participants follows on whether the use of a probabilistic or non-probabilistic approach for forecasting would be adequate. It is agreed both options can be explored.

- **Marinos Kritsotakis** presents the Tympaki River Basin.

The ppt file and recording of the presentation are available in the Virtual Forum

- **Robert Blasko** presents the Slovakian case study, the Nitra River Basin.

The ppt file and recording of the presentation are available in the Virtual Forum

- **Tania Santos** presents the international Caplina-Mauri-Desaguadero system between Peru, Bolivia, and Chile.

The ppt file and recording of the presentation are available in the Virtual Forum

- **Hadi Jaafar** presents the Orontes River Basin, which is shared among Syria, Lebanon, and Turkey.

The ppt file and recording of the presentation are available in the Virtual Forum

- **Dinesh Kumar** presents the Indian case study, the Mahanadi River Basin.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

David Purkey asks what access we actually have to water managers in the living labs, provided that one of the main pillars of the project is to actively engage them in co-creation. Several participants discuss the degree of access to stakeholders in their living labs. In some cases, the decision-makers rely on information provided by partners of the consortium, as is the case of ARPAE (in the Reno River Basin living lab). Some key stakeholders are engaged as partners, the case of KRI in the Tympaki lab. In other cases, key stakeholders must be contacted and engaged. The Coordinator highlights this is indeed the objective of WP1-2, to which a significant chunk of budget has been allotted.

Lunch

Pillar 1: Knowledge networks

Jaroslav Mysiak explains the methods and processes to reach a successful stakeholder engagement. Dr. Mysiak highlights the relevance of combining the knowledge of different partners within each lab, but also

across labs to build a "network of networks", through research collaborations but also, where possible, through exchanges across stakeholders and in science-policy platforms such as the TRANSCEND international workshops. Dr. Mysiak discusses on the role of the 4 local workshops and the 4 international workshops to create synergistic knowledge and outcomes that generate value added. Contingency planning regarding stakeholder engagement is also discussed.

Comments:

C. Dionisio Perez Blanco adds that is critical to know which stakeholders we want to contact, and there are tasks in WP1 that target precisely this during the first months of the project.

David Purkey comments that there are two transnational basins and it will be really challenging to manage this engagement with the different stakeholders/decision-makers of the different countries.

Michael Hanemann comments that it would be a good idea to take a look at how the issues have been carried out in the past and how they are currently implemented, and design engagement strategies consistent with these actions to more successfully engage stakeholders.

Jaroslav Mysiak also highlights the need to focus our work in labs on the needs of these labs and building on the expertise of these labs: each case study has different demands and needs and the response should accordingly change from one region to another. For example, some labs may need more limited efforts in terms of engagement because they have been conducting collective work and decision-making for a long time, but modeling of some key aspects of the basin may be limited; while other labs may experience the opposite situation.

David Purkey asks if there are examples of European labs which have been a success in stakeholder engagement towards transformational adaptation policies, and whether these policies have improved, using a specific framework upon which we can build. To this Jaroslav Mysiak replies that the key aspect is to find a "hook" that attracts the stakeholders and engages them in a collective effort. One option is to rely on the Mission Adaptation funds, which are more easily accessible than other EU funds.

Guido Schmidt highlights the relevance of monitoring the whole process of this transformative and adaptative project to ensure we can measure impact.

-**Javier Sierra Pierna** presents serious games briefly. In these games, one or more challenges are shown to the attendees and then they are requested to find a solution, either as groups or as individuals, and enable scientists to understand how different actors deal with these challenges.

Coffee break

Practical arrangements of working together (I): Coordination

C. Dionisio Pérez Blanco shows examples of financial statement, risk and dissemination excel spreadsheets, and explains how to fill them in for ensuring a successful and periodic monitoring of the activities of all partners.

C. Dionisio Perez Blanco also presents the MB and SC members and the calendar proposed for these meetings, and introduces the role of the EAB and calls for nominations. An excel spreadsheet is shared among partners for them to make endorsements.

Day 2

Starting at: 9:10

Pillar 2: Actionable modeling suite

-C. Dionisio Pérez Blanco welcomes all the attendees and briefly introduces the agenda of the day.

- **Giuliano Di Baldassarre** presents the use of models to simulate the co-evolution of coupled human-water systems for actionable science. Bidirectional feedbacks are illustrated with the modeling framework used by Uppsala University.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Hadi Jaafar asks how models account for the impacts on society, for instance, in the use of irrigation water. To this Giuliano replies that each model is adapted to the case study, including the socioeconomic conditions that need to be simulated and modeled.

Dinesh Kumar comments on the challenge to assign probabilities to predictions and how some governments are not able to adapt to the future, and whether this modeling can help bridge this gap. To this Giuliano replies that the socio-hydrology modeling is developed based on some assumptions and serves to prove different plausible options and solutions but is not up to modelers to decide what to do in the final decision, it is just an illustration of the impacts of alternative policy patterns.

Michael Hanemann comments that models and society are in constant development and improvement, and that the models and technics we use right now may not be the best ones. He highlights this should be debated during the project.

David Purkey asks about Giuliano´s opinion on the information models can provide to drive global adaptation efforts to climate change and on the likelihood of future scenarios. Giuliano replies that models presented focus on the near future (short/medium run) but it could be adapted to longer term simulations and indicators.

- **Francesco Sapino** presents the micro-macro modeling developed by USAL and CMCC. This modeling framework bidirectionally connects hydrological, micro-economic and macro-economic models to assess the socioeconomic and environmental impacts of climatic and policy shocks.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Jaroslav Mysiak asks if the framework could simulate more than one year of farmers' decisions. To this Francesco replies that indeed it can, and also at smaller timesteps within the same year.

Michael Hanemann comments that the decision of farmers, in this case, is not actually based on just one year, is a decision based on several years. He also mentions models should consider more constraints to mimic more accurately the boundedly rational decisions of farmers. Also comments on the sensitivity of the model and what changes should be considered to accurately reflect micro-macro feedback links.

Tim Foster comments that models are not actually accurate, but the basic notion of the presented framework and the basic idea of scientific modeling nowadays is not to offer an accurate forecast and solution for a specific year, but to explore the plausible impacts of alternative solutions under an uncertain future, i.e., a range of scenarios, models and solutions.

Giuliano asks about how this framework could be applied to different contexts and the level of detail that it could achieve. To this Francesco comments that data availability is a significant challenge that constrains the detail of the model.

David Purkey highlight the need to collaborate among living labs and build strong partnerships, including among the early career students hired in the project by each partner, to ensure all the expertise of the consortium is incorporated to each lab.

- **Sina Khatami** presents (online) soft coupling and protocols programming using the OpenMI standard (https://publicwiki.deltares.nl/display/OPENMI/home). This tool offers a framework capable of interconnecting different models which communicate with each other following an automatized modular approach.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

David Purkey and Maggie Kossida raise concerns about the use of the MI Standard as a prerequisite in the project, due to the complexity of the programming language, which may not be accessible for stakeholders once the project is over. Both argue in favor of a more flexible approach where other protocols and programming languages (such as R, or Python) can be used. Giuliano and Sina argue that this standard is but one option, which has its advantages and disadvantages. After a brief exchange among participants, it is agreed that, as per the proposal, the use of the MI Standard is not mandatory – just an option. Since R is the language used for coupling by most partners, it is agreed that R will be the default for coupling – although the MI Standard can be adopted in some labs and/or for some stakeholder models if it is found to be more adequate.

Coffee break

Pillar 3: Monitoring and accounting toolbox

- **Jingshui Huang** presents the WE-ACT project, the "twin project" of TRANSCEND funded under the same call.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

David Purkey asks if the collaboration across projects is mandatory for all laboratories. To this C. Dionisio Perez Blanco replies that is not mandatory to collaborate with any specific project, but it is a requirement to build collaborations with Horizon Europe funded projects of relevance for TRANSCEND—and this seems to be the case of WE-ACT.

Dinesh Kumar asks if the water reallocation in the model is based just on economic aspects or also on the hydrological and social aspects. To this Jingshui Huang replies that also hydrological and social aspects are considered for the water reallocation to bring support to decision-makers.

Michael Hanemann suggests the possibility of bringing Jingshui Huang to General Assemblies and discussing together the cooperation between both projects. Jingshui Huand and C. Dionisio Pérez Blanco agree to have coordination meetings with at least a yearly basis to discuss potential synergies among the two projects.

- **Tim Foster** presents the monitoring and accounting pillar of TRANSCEND.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Michael Hanemann indicates that farmers do not want to be measured, which explains some of the monitoring gaps presented by Tim Foster, but are a critical actor that need to be included in our work. This presents a non-trivial challenge.

A discussion on the accounting of return flows and their relevance emerges, which is interrupted by Tim Foster and the coordinator given the complexity of the topic for the limited time available. The relevance and importance of return flows is highlighted, nonetheless, and the need to model it explicitly.

Hadi Jaafar suggests that all of us should consider the last slide of Tim´s presentation as a starting point for the white paper on monitoring. This involves revising what has been done previously in terms of monitoring, what has been successful (including feedback from stakeholders—both in labs and beyond), and building on these inputs, define guidance to what may succeed in the future.

- **Maggie Kossida** presents the monitoring indicators of water availability, water use, water-related impacts, and institutional performance proposed for the project's pillar 3.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Tim Foster comments that these indicators should be mainstreamed within the models to ensure consistency.

Tania Santos comments that these indicators are critical to accurately convey to stakeholders the effect of proposed TAP, and therefore should be carefully designed.

A discussion emerges on the use of SDG indicators and whether this is the best way to proceed. It is agreed that in terms of water use the WEI indicator may work and should be adopted (either under the name of WEI or other indicator of water exploitation intensity), but other socioeconomic indicators may be incorporated (employment, GDP, income, etc.).

David Purkey highlights that the indicators are not static as it is shown in the presentation, and thus it is important to dynamically co-develop these indicators together with the stakeholders.

Maggie Kossida adds that a critical point is to establish the different thresholds that help us monitor good or poor performance in labs.

- **Jaroslav Mysiak** presents the climate and socioeconomic scenarios.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Michael Hanemann comments that a key difficulty is that of developing a scenario that people take seriously. Jaroslav Mysiak comments that the scenarios should show the ambition of the labs and the project. He also highlights that sometimes these scenarios are part of the solution, since they reveal futures stakeholders had not accounted, and may spur themselves more robust adaptation strategies.

Giuliano Di Baldassarre suggests the idea of using already realized scenarios (even if somewhere else), so as to more effectively engage stakeholders. He argues that this offers advantages as compared to showing stakeholders extreme events that have never happened.

Hadi Jaafar asks what variables are considered for the design of scenarios, whether it is temperature, precipitation, or others. To this Jaroslav Mysiak replies that this depends on the pilots, who will design the different scenarios for each case study using a co-creation approach.

Lunch

Pathways to impact.

-Guido Schmidt presents the role of outcomes and impacts of the project, in the context of Horizon Europe. Guido Schmidt highlights that a key aspect of TRANSCEND was a solid impact pathway, which delivers KPIs at the end of the project, but also outcomes (7y) and impacts (10y), alongside a detailed roadmap explaining how to reach them.

The ppt file and recording of the presentation are available in the Virtual Forum

Comments:

Michael Hanemann asks about the availability of national or regional climate forecast scenarios, and the level of detail, because the US has developed regionally downscaled climate scenarios. California has several reports on this topic. Jaroslav Mysiak and others highlight that the EU has similar information readily available, with significant detail, which offers a source of information that indeed TRANSCEND is set to exploit.

Dinesh Kumar asks how to address the ambitious target of outcome O-4 (table- slide outcomes (5-6 y)).

C. Dionisio Perez Blanco comments that we have to pay attention to the timeline of the outcomes and impacts, since they are expected to realize after the project is over, not during the project's lifetime.

- C. Dionisio Pérez Blanco presents the pathways to impact from project outputs to outcomes (7y) to impacts (10y), as well as the pathways to achieve them. This session finishes without questions and is immediately followed by the practical arrangements session.

The ppt file and recording of the presentation are available in the Virtual Forum

Practical arrangements of working together (III): Impact

-C. Dionisio Pérez Blanco presents the deliverables and milestones for the project; the tools for Communication, Dissemination, and Impact, including:

-Stakeholder events: 28+ workshops, 2 international workshops, 34+ training events, 30 policy briefs ahead of workshops

-Academic events: 2 summer schools, 12+ webinars, 4+ papers, 45+ outreach events

-General public: 14+ local press releases, 14+ citizen science events, 4 webstivals, 14 local citizen panel meetings (1 international meeting)

-28+ newsletters, 3+ brochures, 3 video presentations

The ppt file and recording of the presentation are available in the Virtual Forum

C. Dionisio Pérez-Blanco suggests to have a first draft of the deliverable at least 2 weeks in advance of the deadline, to have time for the revision. He also reminds the participants of the date of the next SC by the end of February. Finally, C. Dionisio Pérez-Blanco reminds the assistants of the need to comment of the first project deliverable, the Inception Report and Roadmap, which will be sent to all PIs by 22 February.

Comments:

Guido Schmidt suggests sending out the first draft of each deliverable for review at least 6 weeks before the deadline, instead of just 2, and sending back the review to authors at least 4 months ahead of the deadline. This is agreed by all, and the proposal is accepted.

Closing and farewell

A group photo is taken and the meeting closes at 16:35h.

Annex III: Meeting materials, including agenda and presentations

Materials are available in the project website (https://transcend.usal.es/) at the following address: Events > Past Events > Kick-off meeting