Project Number: 2023

Project Acronym: TALANOA-WATER

Project title: Talanoa Water Dialogue for Transformational Adaptation to Water Scarcity Under Climate Change

Periodic Technical Report

Part B

Period covered by the report: from 01/06/2021 to 31/05/2023

Periodic report: 2nd (Mid-term report)

Executive summary

This mid-term report (referred to in the proposal as D6.3 – Second 12-month Progress Report) summarizes the work-in-progress review of the first 24 months into the TALANOA-WATER project implementation. It recapitulates the major achievements, challenges and contingent risks identified in each work package, and details supplementary and corrective actions adopted to address these risks. Completed halfway into project implementation, the mid-term report builds on an develops further the First 12-month Progress Report (D6.2). The deliverables D6.4-5 (due in month 36 and 48, respectively) will further update progress and revise the contingent risk strategy to report the implementation into the third and fourth year.

24 months into the project implementation, the TALANOA-WATER Consortium is well on-track to successfully complete the envisaged activities and realize the expected impacts of the project. We have designed multi-sector and multi-stakeholder partnerships and novel financial mechanisms to already achieve the sustainable adoption of TALANOA-WATER ecosystem of innovation in 3 water laboratories (Cega, Po, Litani), thus fully addressing the specific objective SO-03. Moreover, we have achieved significant advances in SO-01 (design and demonstrate technical and institutional feasibility of a transition to sustainable and inclusive growth) and SO-02 (design, test and inform the adoption of robust transformational adaptation strategies). All deliverables and milestones planned for the first 24 months of the project have been delivered and met.

From the onset of the project, we have paid emphasis to consolidating the shared understanding of the three pillars that underpin the ecosystem of innovation of TALANOA-WATER, namely the Talanoa Dialogue (pillar I), the multi-system ensemble modeling framework (pillar II), and work in water labs (pillar III); and to implementing them across labs. We have produced the inputs to run the simulations with the modeling framework; and run simulations informed by science-policy interactions and discussion. To foster stakeholder engagement and co-generation of knowledge and adaptation strategies, we have established six Stakeholder Platforms (one per lab) that comprise public bodies and authorities, irrigators' associations, basin authorities, insurers, regional and local governments, and other relevant organizations and institutions. The Stakeholder Platforms play a crucial role in co-designing robust transformational adaptation strategies, the key objective of TALANOA-WATER, and have been closely involved in the co-design of scenarios, the co-development of models, and the co-evaluation of results.

Contents

1. Explanation of the work carried out by the beneficiaries and Overview of the progress

TALANOA-WATER (Talanoa Water Dialogue for Transformational Adaptation to Water Scarcity under Climate Change) is a PRIMA funded innovation action set to inform and catalyze the adoption of robust transformational adaptation strategies to water scarcity under climate change that contribute to the Integrated Water Resources Management (IWRM) objectives of social equity, economic efficiency and environmental sustainability. A key aspect of TALANOA-WATER is its groundbreaking *ecosystem of innovation* that combines an inclusive and transparent stakeholder engagement method, the Talanoa Dialogue (UNFCCC, 2018), with an actionable modeling framework inspired in interdisciplinary socio-hydrology science (Pande and Sivapalan, 2017), so to design, realize and demonstrate performance of transformational adaptation strategies at various levels (from farm to basin, from user to economic sector) in six large-scale 'pilot water laboratories'. TALANOA-WATER is set to explore transformational adaptation strategies that combine complementary and mutually reinforcing (1) nature-based solutions (e.g. natural water retention), (2) technological innovation and climate/water services (e.g. non-traditional water sources, irrigation services advising the timing and intensity of irrigation and optimal protection of crops against extreme climate events), (3) risk management and financing instruments (e.g. payment for ecosystem services, insurance) and (4) economic and behavioral incentives (e.g. water charges, water markets, voluntary agreements).

Two years into the project implementation, the TALANOA-WATER consortium is well on-track to successfully complete the envisaged activities and realize the expected impacts and specific objectives (SO), some of which have been **already fully achieved**. Specifically, we have designed multi-sector and multi-stakeholder partnerships and novel financial mechanisms to achieve the sustainable adoption of TALANOA-WATER ecosystem of innovation in 3 water laboratories (thus fully addressing SO-03), namely the Cega, Po and Litani; while achieving significant advances in SO-01 (design and demonstrate technical and institutional feasibility of a transition to sustainable and inclusive growth) and SO-02 (design, test and inform the adoption of robust transformational adaptation strategies).

These advances have been cemented on several project activities, including the production of all deliverables and milestones planned until month 24. The deliverable D6.1 (Inception Report and Roadmap) provided initial **guidance** for all partners and stakeholders involved in the project on how to develop the TALANOA-WATER ecosystem of innovation. This guidance has been substantiated in D1.1 (Terms of Reference for the Stakeholder Platform and Talanoa Dialogue), D3.1 (Sourcebook of modeling framework) and D4.1 (Guidance document shared across the six pilot water laboratories), where we have paid emphasis to consolidating the shared understanding of the three pillars that underpin the ecosystem of innovation, including the Talanoa Dialogue (pillar I), the multi-system ensemble modeling framework (pillar II), and work in water labs (pillar III); and to implementing them across labs. Guidance has been also produced to inform data management (D5.2 - Data management plan) and dissemination and exploitation activities (D5.1 - Detailed and revised PEDR, CSP and IPR strategy). The **inputs** to run the simulations with the modeling framework, so as to feed discussions within the ecosystem of innovation, were produced in D2.1 (Hydro, micro-, macro-economic, agronomic and climatic database) and D2.2 (Water Accounting database). The **results** achieved through the implementation of the ecosystem of innovation across the 6 labs have been presented and critically discussed in the Taloanoa Dialogue reports I & II (D1.2 and D1.3) and the Intermediate database of simulations & sourcebook (D3.2). Finally, intermediate **reporting** activities were produced in D6.2 (First 12-month Progress Report) and D5.3 (First 12-month exploitation,

dissemination and comm. report), which have been further developed and assimilated into this mid-term report.

The Consortium has also successfully and timely completed Milestones M1.1 (Draft Terms of Reference, month 6), M1.2 (First annual science-policy workshop), M1.3 (Second annual science-policy workshop), M2.1 (Multi-system database—beta version, month 6), M2.2 (Water accounting database—beta version, month 11), M3.1 (Draft Sourcebook, multi-system model, month 11), M4.1 (Draft guidance document, month 10), M5.1 (Draft PEDR, CSP and IPR, month 5), M5.4 (launch of Water Agora Hub, month 4) and M6.1 (Kick-off meeting and CA, month 2).

The **Talanoa Dialogue** has been consolidated as a methodology for stakeholder engagement in all 6 labs. To foster users' engagement and co-generation of the TALANOA-WATER ecosystem of innovation and services, we have established 6 *Stakeholder Platforms* that bring together relevant stakeholders from pilot water laboratories, including public authorities and policy makers, users' associations, industry, scientists, and civil society organizations. The Stakeholder Platforms have driven the Talanoa Dialogue, thus playing a crucial role in the co-generation of relevant, targeted knowledge. To ensure that the Consortium considers and responds adequately to the recommendations and suggestions from the Stakeholder Platforms and mainstreams them into the Talanoa Dialogue in the pilot water laboratories, we have designated stakeholder engagement and impact champions that are monitored by the Champions Team. These champions are a key mechanism within TALANOA-WATER for the partners to prepare for and follow-up from the Talanoa Dialogue, encouraging knowledge sharing, peer-learning and the incorporation of relevant innovations and developments. The impact champions team has been meeting 3 months before and 1 month after each science-policy workshop using web meeting/conferencing tools, and has been a major driver of successful stakeholder engagement across labs. At present, the Stakeholder Platforms engage 66 institutions and 120 individuals, and has become a key pool of knowledge for TALANOA-WATER's products to draw from the vast experience of local stakeholders, while building on cutting-edge scientific modeling and technical expertise from the Consortium to design and deliver transformational adaptation strategies. The Stakeholder Platforms have been built following several bilateral and multilateral meetings between Consortium partners and stakeholders, and leveraging on the Water Agora articulated around the project website and app. The first and second rounds of local workshops where stakeholders met in each lab already took place, including a serious game to facilitate the interpretation of the outputs produced through the modeling framework.

The economic and/or social value of the TALANOA-WATER transformational adaptation strategies has been illustrated through the implementation of an **actionable socio-hydrology modeling framework** where scientists and stakeholders collaborate in scenario and policy design and modeling efforts. The framework has been used to assess the performance of 17 alternative transformational adaptation policies, including through the use of multi-model and multi-scenario ensembles to support the identification of robust adaptation strategies. User-friendly methodological sourcebooks have been prepared to guide co-generation experiences (notably model co-development and results co-evaluation) with key stakeholders, which have delivered relevant outputs for the project. For example, in the Cega lab the river basin authority has contributed through their basin model, AQUATOOL, to the modeling framework to inform the assessment of scenarios and strategies. The TALANOA-WATER modeling framework has integrated recent groundbreaking contributions from socio-hydrology science and ensemble experiments into a comprehensive protocol-based modular framework including climatic, hydro(geo)logic, agronomic, microeconomic and/or macroeconomic modules. The modules incorporated in each lab multi-model framework depend on the transformational strategy and context of the lab, both of which condition

experimental design. Alternative settings for the modeling framework have been explored in multi-system ensemble experiments, i.e. including multiple models (multi-model ensemble) and model parameters (perturbed physics ensemble) in each module, and experimenting with alternative protocols such as static (time-invariant approach that looks for convergence) v. dynamic (time-variant approach where information is carried over in time).

The project has made substantial progress in the dissemination and exploitation of TALANOA-WATER methods and results, most notably by achieving sustainability of the ecosystem of innovation beyond the project's lifespan in 3 water labs, and through the initiation of 8 inspiration labs where TALANOA-WATER' ecosystem of innovation is being implemented and further developed. Dissemination activities are listed in Section 1.2.5 and presented more in detail in D5.3 and 5.4. In terms of coordination activities, partners have conducted biannual Project Steering Committee meetings (initially planned to happen on an annual basis) and monthly project meetings, supported by bilateral meetings and recurrent online workshops on the Talanoa Dialogue (29/11/2021), data collection (24/09/2021), WaPOR (07/01/2022), and the modeling framework (01/04/2022). Coordination meetings have been complemented with *ad-hoc* work package meetings and Champion Team meetings organized by WP leaders.

1.1. Objectives

Below we list the four Specific Objectives (SO) of TALANOA-WATER and describe, for each of them, the work carried out during the first 24 months of the project towards the achievement of each listed SO.

- **SO-01: Design, realize and demonstrate institutional and technical feasibility and performance of a transition towards sustainable and inclusive growth in different natural and cultural environments in 6 pilot water laboratories.**

We have designed and demonstrated the 1) technical and 2) institutional feasibility of a transition towards sustainable and inclusive growth in different natural and cultural environments in 6 pilot water laboratories. To design and demonstrate 1) *technical feasibility*, we have simulated the economic and environmental impact of 17 transformational adaptation strategies in 6 labs considering 43 alternative scenarios. To design and demonstrate 2) *institutional feasibility*, results have been presented and discussed, and strategies and scenarios iteratively revised, alongside 66 institutions and 120 individuals in 12 serious games (2 per lab). A key indicator of institutional feasibility has been the validation and adoption of the TALANOA-WATER ecosystem of innovation in 3 labs (Po, Cega and Litani), which have secured funding to continue using and improving the ecosystem of innovation until 2027.

- **SO-02: Design, test and inform the adoption of robust transformational adaptation strategies to water scarcity under climate change, harnessing technological innovation (including non-conventional water sources), nature-based solutions, risk management instruments and behavioral incentives (10+ strategies designed and 1 adopted per water laboratory).**

We have co-designed with stakeholders 22 transformational adaptation strategies, each including one or a combination of the individual strategies listed in SO-02 (10 transformational adaptation strategies in the Cega lab, 4 in the Aude lab, 3 in the Nile lab, 3 in the Litani lab, 1 in the Po lab, 1 in the Jeffara lab). All the individual strategies listed in SO-02 have been tested in at least one lab. 17 of the 22 co-designed transformational adaptation strategies have been simulated using the modeling framework. Identification of robust adaptation policies is currently ongoing and will be implemented in the third and fourth round of local workshops in year 3 and 4.

- **SO-03: Design multi-sector and multi-stakeholder partnerships and novel financial mechanisms to secure sustainable investment into, and cost recovery of, transformational adaptation strategies (sustainable adoption of TALANOA-WATER ecosystem of innovation in 3+ water laboratories).**

This objective has been fully achieved by month 24. The sustainability of the ecosystem of innovation in 3 water labs (Po, Cega and Litani) has been secured until 2027 through successful applications to local, EU and international funding opportunities (Horizon Europe projects TRANSCEND and NATURANCE, Spanish R+D project IRENE) with support (and in some cases active leadership) from the local Stakeholder Platforms (i.e., multi-stakeholder partnerships). For example, the main institution responsible for the research in the Po lab until 2027 will be the regional environmental protection agency ARPAE, while in Lebanon the Stakeholder Platform will be supervised until 2027 by the Litani River Authority. Building on the Stakeholder Platforms of TALANOA-WATER several inspiration water labs have been identified, and the methodology of TALANOA-WATER has already been adopted there. Only in Spain, three inspiration water labs in the Júcar, wider Douro (where the Cega is located) and Guadalquivir-Doñana have been established. Other inspiration labs include the Orontes Basin (Lebanon), Nitra Basin (Slovakia), Tympaki Basin (Greece), Mahanadi Basin (India), and Caplina-Mauri-Desaguadero (Bolivia-Chile-Peru). In all these labs, a comprehensive implementation of the ecosystem of innovation will be conducted, including a full-fledged and improved multi-system modeling framework and the Talanoa Dialogue mechanism. Through collaborations with academics from the US and Australia we have also started to explore implementation of the TALANOA-WATER modeling framework in the Colorado Basin and Republican Basin (US) and the Murray-Darling Basin (Australia).

- **SO-04: Synthesize and upscale the results obtained in the targeted pilot water laboratories to inform supra-national (e.g. EU) and national strategies for water resources management, climate adaptation, disaster risk reduction, sustainable development, and ecosystem protection in the Mediterranean area (mainstream TALANOA-WATER results and insights in 4+ national and 1 supranational/EU climate adaptation strategy/plan).**

The relevant task for SO04 (T5.4 UPSCALE, months 42-48) has not started yet. Nevertheless, the project results obtained in the targeted pilot water laboratories have been already mainstreamed into regional and basin-level plans. For example, in the Douro River Basin Management Plan, the construction of three new reservoirs were informed using the ecosystem of innovation of TALANOA-WATER. Contacts with key national stakeholders (including key ministries) to communicate project results and inform national assessments using TALANOA-WATER methods and results have initiated in all labs in the context of annual workshops.

1.2. Explanation of the work carried per WP

1.2.1. WP1 ENGAGE - Stakeholder Platform and Talanoa Dialogue

Objectives

Objectives of the WP1 include:

(1) Set up, manage and assist the Stakeholder Platform that will enable stakeholders to contribute to the design and implementation of TALANOA-WATER;

(2) Design and facilitate the Talanoa Water Dialogue among relevant stakeholders, so to stimulate collaboration, share stories and exchange points of view, co-generate research and knowledge, and build consensus;

(3) Share knowledge produced within and outside the project to stimulate peer learning and partnership building within the consortium and beyond, and assist in the exploitation and dissemination of project results in WP5.

Work conducted

Over the first 24 months of the project, WP1 completed the deliverables D1.1 (Terms of Reference for the Stakeholder Platform and Talanoa Dialogue), D1.2 (Talanoa Dialogue Report I), and D1.3 (Talanoa Dialogue Report II). The Stakeholder Platform was developed and formally established for each of the water labs, and the Terms of Reference for the Talanoa Dialogue were set. Building on the Stakeholder Platform and applying the Terms of Reference for the Talanoa Dialogue, several bi- and multi-lateral meetings with stakeholders, both online and in person, were organized, including 2 workshops per water lab (12 workshops in total).

T1.1 – SCOPE (Defining the scope, composition, and working procedures of the Stakeholder Platform and Talanoa Dialogue) was successfully completed in month 7 under the leadership of CMCC, supported by USAL, and with contributions from AUB, GPAI, INRAE, INAT and GECOSISTEMA. This task elaborated Terms of Reference, composition, working rules, and support for the Stakeholder Platform and the Talanoa Water Dialogue, including an accessible Decalogue of rules to guide the stakeholder engagement process; and further underpinned the development of the six local Stakeholder Platforms that was initiated in D6.1 (Inception Report). T1.1 also nominated for each lab a scientist (which corresponds to the scientific lab coordinator) and stakeholder leader (rapporteur).

T1.2 – TALANOA (Talanoa Water Dialogue) started in month 7, building on the outcomes from D6.1 and D1.1 to further underpin stakeholder engagement in the development, implementation, and advancement of transformational adaptation in labs. Engagement activities in each lab are developed mostly by one partner organization (lab coordinator), building on feedback from the Stakeholder Platform, and under the close leadership of the WP1 lead (CMCC) and supervision from the Impact Champion Team (led by GECOS). T1.2 comprises all activities related to the achievement of an effective and mutually beneficial stakeholder engagement in the project activities through co-generation and relying on the Talanoa principles of empathic and constructive dialogue. T1.2 successfully conducted the first and second rounds of local workshops in close collaboration with the Impact Champions Team of T1.3. The first workshop set the scene, defined a baseline, consolidated the Stakeholder Platforms, identified gaps and challenges, co-designed scenarios and water use limits for the lab, and explored transformational adaptation strategies; in the Cega lab, the first workshop also included an exploratory serious game that served as a prototype for the serious game to be implemented across all labs during the second round of workshops. The second round of workshops presented preliminary modeling results, conducted the serious game (based on the Cega lab experience during the first round of workshops), co-evaluated and co-identified transformational adaptation strategies, and gathered feedback for the next round of simulations. Again, the workshop in the Cega lab explored a new version of the serious game that will be adapted and implemented in the third

workshop in the other labs. Work in T1.2 was coordinated by USAL and GECOS, and implemented on the field by lab scientific coordinators (CMCC, AUB, INRAE, INAT, USAL, GPAI).

T1.3 – INTEGRATE (Knowledge sharing and incorporation) has designed, and periodically updated, stakeholder engagement and impact champions/indicators to ensure that the project Consortium considers and responds adequately to the recommendations and suggestions from the Stakeholder Platform and Talanoa Dialogue in the water labs. The impact champion team was conformed in May 2022 and held its first meeting online in June 2022 (3 months before the first round of local workshops). Subsequent meetings have taken place 1 month after and 3 months before the organization of local science-policy workshops. Work in T1.3 is coordinated by GECOS, which builds on the individual reports received periodically by lab scientific coordinators (CMCC, AUB, INRAE, INAT, USAL, GPAI).

Major achievements

The first round of bi- and multi-lateral contacts with stakeholders, and particularly the first and second round of science-policy workshops, were a success both from the perspective of the Consortium partners and stakeholders. Stakeholders actively engaged in the activities that TALANOA-WATER conducted across all labs, including during workshops. Stakeholders also provided continued support in data collection, policy and scenario co-design, and modeling co-development, even though some data collection difficulties have been faced because of sensitive issues (e.g., dam flows have commercial value, and this represented an obstacle to publicly share them in the Aude lab). Respectful debate and observance of the Talanoa Dialogue has been prevalent, allowing for constructive interactions and solution-oriented discussions—including in labs where (non-trivial) conflicts among stakeholders exist. The serious game approach was perceived by stakeholders as a major driver of constructive interactions, allowing stakeholders to remove themselves from their day-to-day work and position and increasing empathy and understanding. Across labs, stakeholders have repeatedly provided feedback on how to improve the design of serious games to account for relevant aspects. The Consortium has addressed these requests consistently, including through the organization of an *ad-hoc* training session to partners featuring the serious game company Lisode, which took place back-to-back the first General Assembly of Montpellier (December 2022) and provided the methodological tools to develop a new version of the TALANOA-WATER serious game that has been successfully tested in the Cega lab by USAL. The training session, which was not included in the original proposal, was proposed and organized by INRAE to respond the demand for capacity building on serious games that emerged during one of the project monthly meetings. The training session was funded using resources reallocated from open access resources, which became redundant given the transformational agreements recently signed by partners with major publishing houses (see Section 5.1 - “Deviations from the proposal submitted”). The success of our serious gaming approach, which builds upon thorough modeling that provides realistic outcomes to inform decision making, has led stakeholders to demand TALANOA-WATER researchers to conduct serious games in areas beyond the project labs, thus contributing to upscaling TALANOA-WATER methods and accelerating exploitation of TALANOA-WATER results in WP5 (e.g., serious games will be organized by project partners in the Nitra basin or the Reno basin, in Slovakia and Italy respectively, during September 2023 in the framework of other research endeavors inspired and conducted in parallel to TALANOA-WATER—and reliant on complementary funding).

Efficient work of the Impact Champion Team contributed to producing tailored and relevant activities for stakeholder engagement activities in each lab (including local workshops), while ensuring contents are

aligned with the Grant Agreement. Bi- and multi-lateral meetings with stakeholders in between workshops have taken place recurrently, with higher frequency than originally planned (e.g., stakeholders from the Spanish lab have repeatedly demanded USAL to participate in meetings of the World Bank and OECD's WR4ER initiative, as well as in committees to inform policy design at a national level such as the Mar Menor Plan). Participation to workshops was extensive and exceeded expectations (e.g. more than 40 attendants in the French Lab workshops). The multi-lingual Water Agora Hub has also facilitated the conveyance of targeted contents to local stakeholders and ensured their continuous engagement through live access to any project meeting as well as through recordings and meeting minutes. Stakeholders in the project have facilitated access to other networks of stakeholders within and beyond the water labs (e.g., Litani lab stakeholders facilitated contacts with stakeholders from the Orontes lab, which has become an *inspiration lab* of TALANOA-WATER—see WP5; and the French lab was contacted by a neighboring basin to the Aude to get inspiration from TALANOA-WATER). This has been a catalyst for expanding the TALANOA-WATER ecosystem of innovation to other areas, one of the key achievements of the project in its first two years (see WP5).

1.2.2. WP2 DATA - Data gathering and water accounting

Objectives

Objectives of WP2 include:

(1) Gather, process and harmonize a comprehensive and transparent database from available hydrologic, economic, agronomic and climate data sources to support the setup of the modeling framework and simulations.

(2) Use open access remote sensing data and remote sensing data processing techniques to conduct a systematic water accounting analysis and produce estimates of water use.

Work conducted

Over the first reporting period WP2 gathered, processed, and harmonized the necessary data to apply the methods fielded by TALANOA-WATER. WP2 is divided in two tasks: T2.1 - DATABASE (Hydrologic, micro-, macro-economic, agronomic and climatic database) and T2.2 - ACCOUNTING (Comprehensive water accounting estimates of water use). All data collection and protocols to automate the collection and processing of data have been successfully produced. We completed the deliverables D2.1 (Hydrologic, micro-, macro-economic, agronomic and climatic database – sourcebook) and D2.2 (Water Accounting database – sourcebook), two sourcebooks that catalog for each water lab the relevant data that is meant to be used in the modeling phase (WP3).

T2.1 - DATABASE (Hydrologic, micro-, macro-economic, agronomic and climatic database) gathered, processed and harmonized the hydrologic, micro-, macro-economic, agronomic and climatic data necessary to calibrate, validate, couple and run simulations with the modeling framework in WP3. Efforts were coordinated by INRAE with support from INAT, and involved one representative from each lab: GECOS, AUB, INRAE, INAT, USAL, and GPAI. The Hydrologic, micro-, macro-economic, agronomic and climatic database has been fully developed for the 6 labs in the form of a unique Metadata sourcebook available in D2.1. However, some gaps in data indexation persist that have to be addressed to ensure

outcomes from T2.1 are findable, accessible, interoperable and reusable (FAIR). More specifically, in the Lower Nile (GPAI) and Jeffara labs (INAT) some links to data sources had not been provided yet in the database by the date of submission of D2.1, while in the Aude lab information on data sharing restrictions and availability was unavailable for some data inputs. Once this contingency was identified, a contingency planning was issued. By month 24 the Consortium, led by INRAE, conducted a thorough review of D2.1 and data availability and metadata provided. The review concluded that most of this information has been made openly accessible, although some (minor) indexation issues persist that are detailed in Section 5.1 ("Deviations from the proposal submitted").

T2.2 - ACCOUNTING (Comprehensive water accounting estimates of water use) adopted remote sensing products providing information on components such as precipitation and evapotranspiration to produce estimates on the disposition of available water resources across the 6 water laboratories. Initially, the project envisioned a unique methodology for the water accounting method through WaPOR and Water Accounting +. However, interactions with stakeholders and scientists across labs revealed a preference towards adopting, and where necessary improving, existing water accounting methodologies already in use in the water labs. Adopting and improving existing methods aligns with the TALANOA-WATER principle of producing *actionable* science, and was eventually followed. This deviation is described in detail in Section 5.1. Water accounting efforts were coordinated by AUB, with support from INRAE, and involved one representative from each lab: GECOS, AUB, INRAE, INAT, USAL, and GPAI.

Major achievements

TALANOA-WATER has fully and successfully concluded data gathering of hydrologic, micro-, macro-economic, agronomic, and climatic data for all labs. All data sources that were *ex-ante* identified have been successfully incorporated to the project database, and additional relevant data sources identified and incorporated as well. This includes some field data that was obtained to address gaps, particularly regarding economic information. For example, in the Litani Water Lab the required data to calibrate and run the microeconomic model was gathered through an extensive 17-day field survey, mapping out 30 different crop types present in the Bekaa plain within the districts of Zahle, Baalbak, and West Bekaa. The database is findable and accessible to scientists, stakeholders and the wider public in the Digital Repository of the Water Agora hub. TALANOA-WATER has successfully adopted remote sensing products to produce estimates on the disposition of available water resources across the labs. Our accounting framework has followed the widely accepted fractions approach, which makes a distinction between beneficial and non-beneficial and consumptive and non-consumptive uses of water (Willardson et al., 1994). The Litani and Nile labs adopted FAO's WaPOR and Water Accounting+ tools to produce water accounting estimates, relying on programming tools to automate the collection of open-access remote sensing data and computation of water accounting sheets produced. Alternative accounting and remote sensing data and tools have been also used to produce water use and consumption estimates in the Jeffara, Cega and Aude labs (Hidromore, CRITERIA, SIMETAW). Thorough quality controls of associated spatial data components have been conducted, coordinated by AUB and INRAE. In the Litani Catchment water lab thorough quality controls of associated spatial data components have been conducted, coordinated by AUB and INRAE. In the Litani Catchment water lab, we ran the rapid Water Accounting plus system (WA+) using remote sensing data sourced from FAO's WaPOR database, along with other open-access databases and time-series data of ground observations and performed a basin-wide analysis from 2017 to 2020. Collection of open-access remote sensing data was automated and computation of water accounting sheets was performed to report on water fluxes, flows, and stocks.

1.2.3. WP3 MODELING - Actionable socio-hydrology science

Objectives

Objectives of the WP3 include:

(1) Develop interdisciplinary understanding of current state of modeling of water scarcity under climate change.

(2) Develop a multi-system, multi-model ensemble framework using a protocol-based modular approach.

(3) Quantify the economic and environmental impact of transformational adaptation, considering multiple scenarios and model settings (i.e. uncertainty sampling).

Work conducted

WP3 is the 'cradle' for the interdisciplinary teamwork of the entire consortium. WP3 aims to collectively scrutinize and consolidate shared understanding and knowledge of key concepts; develop, revise, and refine the multi-system modeling framework; and conduct simulations to assess impacts of transformational adaptation under climate and socioeconomic scenarios. WP3 is divided in two tasks: T3.1 (FRAMEWORK: Multi- system modeling framework) took place over the first year (month 7-12) and has been already completed; while T3.1 started in month 12 and will last until month 36.

Task 3.1 FRAMEWORK (Multi- system modeling framework) took place during months 7-12. T3.1 successfully built the multi-system, multi-model ensemble framework using a protocol-based modular approach. The results of this task are available in D3.1. Work on T3.1 was led by USAL and CMCC in tandem, with contributions from AUB, INRAE and INAT. T3.1 surveyed the literature on socio-hydrology and ensemble experiments and identified the key gaps that TALANOA-WATER methodological framework was set to address. Building on this comprehensive assessment, T3.1 then went on to develop the modeling framework adopted in TALANOA-WATER, identifying the relevant modules for each lab (microeconomic, macroeconomic, hydrological, agronomic and/or climate) and the models that will populate each of them, as well as designing the (bi-directional) protocols to connect all modules under both a static and dynamic setting. T3.1 also developed a rapid assessment option of the modeling framework that has been/will be used during exploratory workshops (workshops 1-4) to support interactive tools for decision-making applications (notably serious games). Work in T3.1 included bi- and multi-lateral meetings, extensive lab and scientific work, and a major online workshop organized by USAL in month 11 where collective knowledge and understanding was consolidated, and the key pillars of the framework agreed (see D3.1 for a detailed description of the research process and results).

Task 3.2 IMPACTS (Modeling transformational adaptation impacts on human and water systems) started in month 12 and is currently ongoing. T3.2 uses the multi-system modeling framework developed in T3.1 to quantify and map the impact of transformational adaptation strategies on human and water systems under future change scenarios. Under T3.2 we have produced D3.2, a FAIR database containing the outputs obtained from the first round of simulations conducted across labs. Work in D3.1 is led by USAL and CMCC in tandem, with relevant support from INAT, and involves one representative from each lab: CMCC, AUB, INRAE, INAT, USAL, GPAI.

Major achievements

The draft report of D3.1 (Milestone 3.1) was circulated among the members of the Consortium and discussed in a dedicated online workshop in month 11 (workshop minutes are available in D3.1 and in the Water Agora). The workshop to discuss the draft of D3.1 built on inputs from stakeholders across all 6 labs and was a success in view of all partners of the Consortium. The workshop revealed the generally good disposition of local stakeholders to contribute to the project with their modeling expertise. Accordingly, D3.1 decided to build the modeling framework leveraging on the synergistic scientific knowledge of partners *and* stakeholders. For example, the Douro River Basin Authority in Spain has contributed to building actionable models by integrating its Decision Support System AQUATOOL into the modeling framework of the Cega lab. The theoretical framework underpinning the TALANOA-WATER modeling framework has crystalized in several working papers and publications containing the major methodological breakthroughs towards the development of the TALANOA-WATER actionable socio-hydrology modeling approach (see e.g. Pérez-Blanco et al., 2022; Pérez-Blanco and Sapino, 2022). Efficient collaborative work has already made possible the design and calibration of modules, the setup of the modeling framework in all labs, and the production of the first simulation results under D3.2. For example, in the Litani water lab an integrated model has been set up that interconnects FAO's WaPOR remotely sensed estimates of biomass and water use with an ensemble of mathematical programming models to assess the adaptive responses of water uses to diminishing water allocations under climate change, both for rain-fed and irrigated crops. This innovative tool is supporting water management policies in the Upper Litani Basin, and is replicable to other water-stressed basins.

1.2.4. WP4 LABORATORIES – Pilot water laboratories

Objectives

Objectives of the WP4 include:

(1) Design, realize and demonstrate institutional and technical feasibility and performance of a transition towards sustainable and inclusive growth in 6 pilot water laboratories representative of major ecosystem types and legal, political and regulatory systems across the Mediterranean.

(2) Design, test and inform the adoption of robust transformational adaptation strategies capable of achieving inclusive growth within sustainable water use limits.

(3) Develop and validate a portfolio of multi-sector and multi-stakeholder partnerships and innovative financial mechanisms to catalyze sustainable implementation of transformational adaptation strategies in the water labs.

Work conducted

WP4 has applied the ecosystem of innovation developed in WP1-3 across the six pilot water laboratories. In doing so, WP4 has generated new evidence and knowledge on how transformational adaptation strategies can achieve inclusive and sustainable growth, and quantified the costs and benefits of their implementation. WP4 has conducted a preliminary assessment of obstacles and feasibility of transformational adaptation,

and initiated the study of appropriate changes to legal, policy and/or regulatory frameworks for adopting and maintaining transformational adaptation.

T4.1 – PLATFORM (Platform for coordinated and harmonized implementation of the ecosystem of innovation in water laboratories) has designed consolidated and practical guidance on how to achieve robust transformational adaptation on the ground. To this end, T4.1 has guided, overseen and facilitated the implementation of TALANOA-WATER ecosystem of innovation (WP1-3) in the 6 pilot water laboratories. T4.1 consists of nine major subtasks (ST) that guide co-generation processes across labs, namely: ST4.1.1 – Getting Started, ST4.1.2 – Scenarios, ST4.1.3 – Sustainable Water Limits, ST4.1.4 – Strategies, ST4.1.5 – Impacts and Tradeoffs, ST4.1.6 – Robust Decision-Making, ST4.1.7 – Proof of Concept, ST4.1.8 – Breaking Ground, and ST4.1.9 – Synthesis and Recommendations. Work in T4.1 has led to the production of D4.1 (Guidance document shared across the six pilot water laboratories), a guidance to conduct work in the water laboratories, which substantiated the ST in T4.1 building on inputs from WP1-3 and on a series of dedicated monthly workshops organized under the auspices of INRAE and USAL (see D4.1 and the Agora for the workshop minutes). INRAE coordinates work in T4.1 in tandem with INAT and with contributions from USAL, AUB and GPAI.

In month 12, **T4.2 – LABORATORIES (Pilot water laboratories)** started the implementation of the ecosystem of innovation across the six pilot water laboratories, and TALANOA-WATER thus formally moved from concept to practice in operationalizing transformational adaptation in labs. Task T4.2 is led by INRAE and INAT in tandem and has six ST, each referring to an individual lab and led by the relevant scientific coordinator (CMCC, USAL, INRAE, AUB, INAT, GPAI). Each lab scientific coordinator in T4.2 is in charge of implementing ST4.1.1 to 4.1.6 in their water lab, under the guidance and supervision of the Platform (see T4.1). For each water lab a local scientific coordinator has been established, which is in close contact with all stakeholders and a key local stakeholder coordinator (rapporteur) (see D1.1). The challenging task of monitoring and assessing the quality of this interaction falls in the hands of the Impact Champion Team (see T1.3), which has designed Impact Champion Indicators for this purpose (see D1.1).

Major achievements

WP4 addresses work on-the-ground towards the design and effective implementation of robust transformational adaptation strategies in 6 water labs, and represents 43% of the TALANOA-WATER personnel efforts. During the first year, the WP4 designed the Platform for coordinated and harmonized implementation of the ecosystem of innovation (T4.1), which guides and coordinates work across all 6 labs. The objective is to build on both ambitious and pragmatic options for the development of the ecosystem of innovation, e.g., by developing new events and opportunities for dialogue and by integrating into our project already existing spaces for knowledge sharing among stakeholders (including scientists). After a first WP4 kick-off workshop, the Platform has met online monthly, in a regular meeting that takes place every first Tuesday of the month since month 10. These meetings have allowed us to build agreement on the main elements of the guidance document, identify needs from partners (e.g., capacity building on serious game), and supervising the implementation of the ecosystem of innovation across labs. The Platform will continue to meet until the end of T4.1 in month 44 to monthly monitor and coordinate the work conducted in all labs.

ST4.1.1 (Getting Started) was successfully concluded with the production of D4.1, and current work is focusing on monitoring and guiding the iterative stock-taking process from ST4.1.2 to ST4.1.6 (Scenarios, Sustainable Water Use limits, Strategies, Impacts & tradeoffs, Robust decision-making). A key task conducted during the first and second year involved the preparation of the first and second rounds of local

workshops. Preparation of local workshops started with identifying venues and determining the dates, as well as a discussion about the agenda and thematic orientation of each workshop among lab coordinators and the Impact Champion Team (see WP3), building on feedback from local stakeholders.

The organization of local Stakeholder Platforms and allocation of separate resources for each lab scientific coordinator (including for the organization of local workshops) provided flexibility and helped to further cement the relationship with stakeholders. In Spain, work in the Cega Catchment lab from the early stages of the project has spilled over into multiple collaborations between USAL and the Douro River Basin Authority to apply the modeling framework of TALANOA-WATER in several catchments elsewhere in the Douro Basin, mainly to assess dam construction projects in the context of the river basin planning cycle 2016-2021 (still ongoing)—thus providing early legacy and upscaling outcomes (T5.3-4). In Italy, GECOS and CMCC leveraged on past and ongoing projects (e.g., ICISK, NATURANCE, UNTWIST) to organize a large multilateral meeting (instead of the bilateral meetings or smaller multi-actor meetings organized in other labs), which produced relevant feedback from stakeholders and started building synergies across science and policy domains ahead of the first local workshop. In Tunisia and after consulting local stakeholders, INAT proposed to organize several lab workshops instead of just one, and to reinforce its team with a stakeholder engagement specialist from a local research center in the study area, whose insights benefitted all other labs through cross-fertilization in the Platform (T4.1).

Synergies with other projects working on TALANOA-WATER labs have been sought and built, also in the organization of workshops, to enhance impact and outreach. For example, the first local workshop in the Spanish lab was jointly organized by TALANOA-WATER and IRENE (Spanish R+D Plan project). This workshop was highly instrumental in the adoption of the Hidromore Water Accounting modeling approach, which has complemented water accounting efforts with WaPOR and Water Accounting +. Moreover, the project coordinator participates in regular meetings with the coordinator of other PRIMA projects funded in the same call (MAGO, ACQUAOUNT, TRUST), and the coordinators from these projects have been invited to the first International Science-Policy Workshop of TALANOA-WATER, as well as the science-policy session organized by TALANOA-WATER in the forthcoming EAERE 2023 Conference. The possibility to organize a joint workshop/meeting is also being explored.

1.2.5. WP5 EXPLOIT – Exploitation, dissemination, and communication

Objectives

Objectives of the WP5 include:

(1) Design and monitor the Plan for the Exploitation and Dissemination of Results (PEDR); Data Management Plan (DMP); and Intellectual Property Rights agreement (IPR).

(2) Design and monitor the Communication Strategy and Plan (CSP).

(3) Develop communication platforms and instruments, design high-quality communication products and ensure their effective dissemination.

(4) Explore legacy strategies.

(5) Identify the extent to which current legal, policy and regulatory frameworks in Mediterranean countries enable large-scale implementation of transformational adaptation; and explore reform options for addressing barriers.

Work conducted

Task 5.1 EXPLOIT: Strategic direction of the PEDR and IPR management plan and **Task 5.2 COMMUNICATION: Communication Strategy and Plan.** Over the first 24-month period WP5 implemented many outreach activities and produced a range of dissemination products, including the setup of the Water Agora website and app. Beyond the conventional approach that uses online communication as an "information clearing-house" or "info-point" (EC, 2014), TALANOA-WATER uses online communication also as a tool to actively engage, discuss, build consensus, take decisions and coordinate actions within the TALANOA-WATER network of scientists and stakeholders. To this end an online, multi-lateral, multi-purpose and multi-lingual communication strategy has been developed around the Water Agora, the communication hub of TALANOA-WATER. The agora encompasses all channels of communication in the project, including live online access to workshops and other events. The agora was made multi-lingual (Spanish, French, and English—with Arabic translation currently in progress) as part of WP5 dissemination activities to provide ease of access to non-English speaker stakeholders in the labs. We produced a video presenting the project, which has been uploaded to the agora as well, as well as the project logo. T5.1 and 5.2 employ the agora to convey all information about the project, including all deliverables and scientific outputs (papers, presentations in conferences), as well as information, minutes, and recordings of all major scientific and stakeholder events. A Twitter profile is maintained with flash news and reports to reach a wider audience beyond the project stakeholders. A Facebook profile in Arabic (led by the Jeffara lab) and French (Aude Lab) is also maintained as well as a dedicated Internet site for the Aude catchment (https://talanoa-water-france.hub.inrae.fr/). We have contributed to several events or sessions on major conferences on water resources management under climate change (including International Association for Hydro-Environment Engineering and Research/IAHR World Congress, AGU Fall meeting, EAERE Conference, MED-IAERE Conference, among others). Several of TALANOA-WATER partners have published scientific articles, all of which gold open access. A detailed account of communication and dissemination products in TALANOA-WATER is available in Part A of the technical report in MEL; while more in-depth information on the exploitation, dissemination and communication activities is available in deliverable D5.3 – First 12-month exploitation, dissemination and communication report (updated in D5.4 – Second 12-month exploitation, dissemination and communication report, to be released one month after this mid-term report). USAL and CMCC have led the exploitation and communication strategies respectively, coordinating dissemination products across all labs and engaging all partners.

Over its first 24 months WP5 produced three key deliverables: D5.1 - Detailed and revised PEDR, CSP and IPR strategy; D5.2 - Data management plan (DMP); and D5.3 - First 12-month exploitation, dissemination and communication report. D5.1 was led by USAL with inputs from all partners and produced the detailed and revised Exploitation and Dissemination of Results (PEDR), Intellectual Property Rights (IPR) and Communication Strategy and Plan (CSP). D5.1 overviews the transfer and dissemination of the background knowledge and actively encourages, while fully respecting the agreed IPR rules, the wider reuse and exploitation of the original foreground generated throughout the project execution. It scrutinizes the knowledge needs of stakeholders, so as to guide the dissemination activities, and identifies the measures to maximize the impacts of the dissemination, including a list of the indicators to monitor their success

(including dedicated impact champions). It presents the scope and instruments adopted for online communication in the Water Agora, the approach adopted for scientific publishing and policy communication, and the methods for stakeholder engagement through training, workshops and serious games. D5.2 was developed by AUB and covers the overall data management approach of the TALANOA-WATER project and is aligned with the Horizon 2020 DMP FAIR data management guidelines, that is findable, accessible, interoperable, and re-usable. The DMP guides the organization of data and knowledge generated by the project to be useful to other research projects revolved around socio-hydrologic water themes, as well as to interested stakeholders. Finally, D5.3 was led by CMCC with inputs from all partners and reported the exploitation, communication and dissemination activities and main achievements over the first 12 months of the project.

Task 5.3 LEGACY: Project's legacy and extension of the ecosystem of innovation beyond the project lifespan. T5.3 aims to achieve the sustainability of the ecosystem of innovation beyond the project's lifespan in 3+ (and up to 6) water labs, and introduce it in 2+ inspiration water labs. This task has been one of the greatest successes of the project over its first 24 months and has been **fully achieved by month 24**. The sustainability of the ecosystem of innovation in 3 water labs (Po, Cega and Litani) has been secured until 2027 through successful applications to local, EU and international funding opportunities (Horizon Europe projects TRANSCEND and NATURANCE, Spanish R+D project IRENE) with support (and in some cases active leadership) from the local Stakeholder Platforms. Building on the Stakeholder Platforms of TALANOA-WATER, several inspiration water labs have been identified and work using the methodology of TALANOA-WATER has already been initiated in them. Only in Spain, three water labs in the Júcar, wider Douro (where the Cega is located) and Guadalquivir-Doñana have been established. Other inspiration labs include the Orontes Basin (Lebanon), Nitra Basin (Slovakia), Tympaki Basin (Greece), Mahanadi Basin (India), and Caplina-Mauri-Desaguadero (Bolovia-Chile-Peru). Through collaborations with academics from the US and Australia we have also started to explore implementation of the TALANOA-WATER modeling framework in the Colorado Basin and Republican Basin (US) and the Murray-Darling Basin (Australia).

Task 5.4 UPSCALE: Synthesis and upscaling of key results and recommendations. *This task has not started yet – it will take place in month 42-48.*

Major achievements

Major achievements include:

1) Sustainability of the ecosystem of innovation beyond the project's lifespan in 3 water labs.
2) Initiation of 8 inspiration labs.

Achievements 1 and 2 mean that SO03 has been already fully achieved.

3) Organization of 12 workshops (2 per water lab).
4) 400+ flyers printed and distributed.
5) Dissemination video and logo.
6) Participation in 25 international conferences, including i.a. AGU Fall meeting 2021, IAERE Annual Conference 2022, MED-IAERE Conference 2022.
7) 11 publications in peer-reviewed journals (all of them Q1) for which the PRIMA contribution under the TALANOA-WATER grant agreement was acknowledged. All publications were made gold

open access. Journals in which we published include i.a. Water Resources Research, Journal of Hydrology, Agricultural Water Management, Journal of Environmental Management, and Ecological Economics (all of which listed as JCR Q1).

8) Setup of the multi-lingual Water Agora hub.
9) Adoption of the modeling framework to inform dam construction assessment projects over the entire Douro Basin in Spain, anticipating legacy activities planned for the second year onwards.

1.2.6. WP6 COORDINATION

Objectives

Objectives of the WP6 include:

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

(2) Ensure sound and efficient coordination and management, in compliance with the Grant Agreement and the Consortium Agreement

Work conducted

WP6 is devoted to project coordination and management; progress monitoring; periodic review, identification of risk of underachievement and contingency planning; internal communication among the consortium partners; and involvement of external advisory board. WP6 organizes and chairs the annual General Assemblies and Project Steering Committee (PSC) meetings. It maintains a close and constant contact with the High Level External Advisory Board (HLEAB) and ensures effective communication between PRIMA and the Consortium. The latter includes preparation of periodic reports and regular briefing of the PRIMA officer on the project development—including through annual progress reports.

T6.1 START (Kick-off meeting, consortium agreement, inception report and roadmap, and initial implementation activities) was completed in month 2. Before the project started, the project coordinator with the support of the WPs lead partner organizations successfully conducted the negotiations with PRIMA and promptly responded to all requests towards signing and implementing the Grant Agreement. T6.1 also involved the preparation of the Inception Report (IR) and roadmap (D6.1). The IR and roadmap further detailed the roles and responsibilities of each partner within each task and work package. The period up to the release of the inception report also allowed for:

(i) organizing the kick-off project meeting in month 2. This meeting was initially planned to be held in person in Salamanca by USAL, but due to the COVID-19 emergency it was held online, as per the contingency planning specified in the Grant Agreement. The meeting minutes area available in D6.1 and also at the Water Agora (website and app).
(ii) initiating the project management bodies, including the Project Coordination unit (Project Coordinator and Project Manager at USAL) and the Project Steering Committee conformed by one representative from each project partner.
(iii) making operational the High Level External Advisory Board (HLEAB), whose composition is detailed in D6.1.

(iv) mobilizing stakeholders towards the conformation of the core of the labs' Stakeholder Platforms, whose structure was further defined in T1.1. The Stakeholder Platform is a living entity and new additions have been made as the project progressed in the context of WP1.

T6.2 COORD (Project coordination and management) and **T6.3 CONTINGENCY (Assessment of the risk of delays in the project and contingency planning)** carried out activities to ensure effective and efficient coordination of the project. Both tasks are led by USAL, which organizes relevant activities with support from AUB and INRAE, and participation from all partners. PSC meetings have been arranged twice a year (twice as many as initially planned in the Consortium Agreement, which foresaw 1+ PSC meeting per year): during the kick-off meeting organized by USAL (online, 24/06/2021), online (03/05/2022), in Montpellier (12/12/2022 to 15/12/2022) and in Salamanca (31/05/2023 to 01/06/2023). The Project Coordinator (PC) hold a series of encounters with the members of the HLEAB over month 1 to 4, and members have been invited to attend local workshops closer to their countries of residence during the first and second rounds of workshops. HLEAB members have revised the strategic deliverables D6.1 (Inception report and Roadmap) and D6.2 (First 12-month progress report). HLEAB members will gather in person for the first time in the International Stakeholder Workshop in Tunisia in September 2023. WP6 also put in place efficient shared document repository in the Water Agora supported by GDrive, and internal communication instruments consisting of mailing lists (name_list@usal.es) for PIs (Talanoa-water_pis@), PIs and project managers (Talanoa-water_pis_pms@), and the whole consortium (Talanoa-water_all@). Progress reporting is implemented with 12-month periodicity, in month 12, 24, 36 and 48. The 1st Annual Report was highly instrumental in the preparation of this mid-term report, and conducted a first comprehensive assessment of the project achievements and gaps that allowed the coordination team to propose corrective actions. WP6 organized jointly with the thematic WPs online workshops on the Talanoa Dialogue (29/11/2021), data collection (24/09/2021), WaPOR (07/01/2022), and the modeling framework (01/04/2022). USAL has organized in tandem with INRAE monthly meetings to assess progress with a focus on the implementation of the ecosystem of innovation on water labs.

USAL has represented the Consortium in the successive contacts with the PRIMA project officer Marco Orlando, overseen gender issues as per the Grant Agreement, monitored the fulfillment of the project's targets and objectives, supervised and managed the tasks assigned to the PSC, fostered the involvement of the HLEAB (including bilateral meetings, invitation to workshops, and engagement in D6.1 and D6.2), and supervised and managed the Water Agora hub that was setup for communication purposes across partners and stakeholders as part of dissemination and communication efforts in WP5. As part of T6.2, the second General Assembly of Montpellier (hosted by INRAE and co-organized between INRAE and USAL) and the PSC meeting in Salamanca (hosted by USAL) have been planned and organized. Contingency planning in all these activities, as well as all other WPs, is constantly monitored in WP6. The contingency plans designed are summarized in Part A of the technical report, and its implications described in detail in Section 5.1.

Major achievements

WP6 succeeded in acting as the intellectual harbinger of the project as part of the work in T6.1 and particularly in D6.1, which fostered shared understanding of the key concepts, stakeholder engagement, modeling frameworks that will be used throughout the lifespan of the project, as well as of the transformational adaptation strategies that will be explored. T6.1 also developed early strategies for

stakeholder engagement, enabled new insights from the users and stakeholders via its early incorporation into the project, revised and refined the workplan and initiated the project management bodies.

WP6 organized four PSC meetings, one kick-off meeting and a General Assembly, mobilized the HLEAB, put in place efficient shared document repository and communication via the Water Agora, successfully managed communications with the project manager (including redesign of the Consortium following withdrawal of a partner), and organized several dedicated meetings in collaboration with other work packages, including: Impact Champions meetings 1 month after and 3 months before the organization of local stakeholder workshops, arranged by GECOS in tandem with USAL; Monthly meetings, organized the first Tuesday of the month, arranged by USAL in tandem with INRAE; WP2 Task 2.1. Database dedicated Meeting. 24 September 2022; WP1 Task 1.1. Scope definition of Talanoa-Dialogue. 29 November 2022; WP4 Task 4.1. Launch of Modeling Framework. 8 March 2022; WP3 Task 3.1. Modeling Framework Workshop preparation meeting. 1 April 2022; WP3 Task 3.1. Modeling Framework Workshop. 19 April 2022; WP4 Task 4.1. TALANOA-Dialogue dedicated meeting. 10 May 2022.

All meeting minutes and recordings are available at the Water Agora website and app. Further to meetings, WP6 has carried contingency planning that has managed to identify and effectively address risks. This is reported in Section 5.

1.3. Impact

TALANOA-WATER has been designed to meet, and where possible exceed, all the expected impacts specified in the topic 1.1.1 of the call. Table 1 maps our expected contribution, as described in the Grant Agreement, to the impacts realized thus far, detailing whether the impact strategy is still relevant or has been updated, and how.

Table 1: Expected and realized contributions of TALANOA-WATER to the call

Expected contribution in the proposal	**Realized contribution underlining those fully achieved [required updates in brackets]**
-Test and validate a groundbreaking ecosystem of innovation that combines an inclusive and transparent stakeholder engagement method (Talanoa Dialogue) with a multi-system modeling framework integrating climate, hydrology, agronomic and socio-economic systems in **6 water laboratories**. -Assess the economic and environmental performance of **10 or more (10+) adaptation strategies** in each lab, and identify **1 robust strategy** in each lab. -Adoption of the TALANOA-WATER ecosystem of innovation as a governance model in **3+ water laboratories.**	-The ecosystem of innovation has been tested across all 6 labs, and validated in 3 of them (Po, Cega and Litani). -17 adaptation strategies (out of 60+ expected by the end of the project) simulated using the modeling framework. Identification of robust adaptation policies ongoing (expected by month 36). -Sustainable adoption of TALANOA-WATER ecosystem of innovation as a governance model in 3 labs (Po, Cega and Litani).
-Compare socio-economic and environmental performance of each transformational adaptation strategy explored against a baseline (conventional adaptation/no adaptation) under **100+ scenarios and 10+ alternative model settings**, in terms of equity, sustainability and economic growth. -Assess tradeoffs and co-benefits within and across systems (e.g. water conservation and quality v. income and food security). -Serious game to demonstrate impacts of transformational adaptation policies and to compare them to the outcomes of the choices that would have been made otherwise (baseline), without backing from TALANOA-WATER knowledge. -Identify **6 robust strategies** (one per laboratory) that show a satisfactory performance under most conceivable futures.	-43 scenarios co-designed with stakeholders. Socioeconomic performance (including impacts on income and its distribution) assessed for 17 scenarios using 12 alternative model settings. -Tradeoffs across systems (multi-system simulations) assessed in 5 simulations. -Serious game implemented to illustrate performance of transformational adaptation strategies against baseline in 6 labs (1 round in all labs, 2 in the Cega lab). -Identification of robust adaptation policies ongoing.
-All adaptation strategies considered will deal with irrigated agriculture, the largest water user in all water laboratories. -Comprehensive water accounting that follows the fractions approach. Water use estimates will be obtained following FAO WaPOR's approach. We will develop demand-supply balances and water exploitation indices in each laboratory. -Adaptation strategies will feature irrigation technologies and services to optimize agricultural water management; alongside non-conventional resources, including wastewater. Their impact will be assessed locally (irrigation network) and basin-wide leveraging on the comprehensive accounting framework. -TALANOA-WATER will spur a *transformational adaptation* that creates and realizes governance and business opportunity potential towards sustainable and equitable growth in six pilot water laboratories. -Inclusive Talanoa Dialogue, devoid of blame, will work towards consensus building and prevent socio-economic conflicts in the use of water. -for each water laboratory we will **identify and adopt, *among those strategies that are robust,* 1 preferred/optimal adaptation strategy** in terms of social equity, economic efficiency and environmental sustainability.	-All 22 transformational adaptation strategies co-designed with stakeholders, of which 17 simulated (out of 60+ expected by the end of the project), deal with agriculture. -6 water accounting exercises have been conducted following the fractions approach. The 6th water accounting exercise (Nile Basin) is still pending. [**Update of expected impact:** Interactions with stakeholders and scientists revealed a preference towards adopting, and where necessary improving, existing methodologies already in use in the water labs for the accounting exercise, rather than introducing WaPOR. This suggestion aligns with TALANOA-WATER principle of producing actionable science, and accordingly those models already in used by stakeholders were used for the accounting exercise] -3 simulations featuring irrigation modernization, whose impact has been assessed basin-wide and locally. -Transformational adaptation initiated in 6 labs, 3 labs adopt ecosystem of innovation to inform policy making. Several transformational policies informed (e.g., negative assessment of dam construction project in favor of water reallocations through regulatory instruments). -Inclusive Talanoa Dialogue already initiated in all 6 labs, no conflicts have emerged. -Identification of robust adaptation policies ongoing.

-Pilot water laboratories operate at various scales, from regional (e.g. Cega) to international/transboundary (e.g. Nile). -The Talanoa Dialogue aims to build trust and empathy among stakeholders. -Remote sensing-based water accounting will improve detection of non-compliant behavior (e.g. illegal abstractions); Talanoa Dialogue will provide a forum to build consensus towards greater legal security and compliance.	-Work conducted at various scales, from local to national. [**Update of expected impact:** the Nile Basin lab had to focus its activity on the Nile Delta due to the negative assessment of the Egyptian government to conduct assessments on the impact of the Grand Ethiopian Renaissance Dam or transboundary reallocations. NWRC, the partner to conduct this assessment, did not receive approval from the Egyptian government to participate in the project and had to be excluded. Transboundary inspiration labs in the Orontes Basin and Caplina-Mauri-Desaguadero Basin established]. -Talanoa Dialogue implemented and validated. Positive stakeholders feedback in all labs. -*Ad-hoc* assessments for illegal uses implemented in the Cega lab using Hidromore. Findings have been discussed in the context of workshops.
-**Train 3+ institutions** (including relevant river basin authority and ministries) **and 9+ individuals in each pilot water laboratory** on integrated IWRM and CCA socio-hydrology modeling. -**Train 3+ institutions** (including relevant river basin authority and ministries) **and 6+ individuals in each pilot water laboratory** on Talanoa Dialogue. -**Train 10+ PhD students** on integrated socio-hydrology modeling and stakeholder engagement/Talanoa Dialogue/co-generation approach	-66 institutions and 120 individuals involved in workshops, including briefings and theoretical training sessions on modeling approaches adopted in TALANOA-WATER for IWRM. -66 institutions and 120 individuals involved in workshops, including briefings training sessions on Talanoa Dialogue and serious games foundations. -5 PhD students trained.
-Substitute conventional modeling and decision-making by TALANOA-WATER ecosystem of innovation in **3+ laboratories** -Ensure sustainability of the ecosystem of innovation in **3+ project laboratories for 3+ years** after project ends, through legacy strategies (see WP5), including securing **50 000+ EUR/year** from institutional- (e.g. basin authority), users' associations- or industry-driven projects -mainstream project results in **4+ national and 1 supranational adaptation plan** (EU) leveraging on project partners and stakeholders leading roles in them	-In Cega (and wider Douro), conventional decision-making and modeling replaced by TALANOA-WATER ecosystem of innovation; in Litani and Po, they complement conventional approaches. -Sustainability of ecosystem of innovation ensured in 3 labs (Po, Cega and Litani) until 2027 through successful applications to local, EU and international funding opportunities (Horizon Europe projects TRANSCEND and NATURANCE, Spanish R+D project IRENE). -The relevant task for this impact (T5.4 UPSCALE) has not started yet. Nevertheless, project results have been already mainstreamed into regional and basin-level plans (Douro, Po). Partners have participated in Green Deal review assessments. Contacts initiated with key national stakeholders to participate in national assessments.

2. Update of the plan for exploitation and dissemination of results

Not applicable.

3. Update of the data management plan

Not applicable.

4. Follow-up of recommendations and comments from previous review(s)

Not applicable.

5. Deviations from the proposal submitted

5.1. Tasks

5.1.1. WP1 ENGAGE - Stakeholder Platform and Talanoa Dialogue

Description of deviation and contingency planning

-Task 1.1 SCOPE: Defining the scope, composition, and working procedures of the Stakeholder Platform and Talanoa Dialogue. The PSC has expressed its concern over the gender bias in the six Stakeholder Platforms. Much of this bias is because most managerial positions in key institutions, enterprises or other relevant stakeholders are taken by men. This threatens the target set in the Description of Work that aims at promoting women access to training and transformational adaptation strategies such as irrigation services throughout the project, as well as achieving a gender-balanced stakeholder engagement process. The Impact Champion team (T1.3) has been issuing advice to lab scientific coordinators to enhance gender balance in Stakeholder Platforms but advances have been limited. It has been agreed to invite more women in intermediate positions of command in key institutions to bridge the gender gap. The Impact Champions Team has defined a gender-sensitive indicator to monitor performance.

-Task 1.2 TALANOA: Talanoa Water Dialogue. Deliverable D1.2 (Talanoa Dialogue Report I), due on 31st May 2022, was submitted with a delay of 7 months. The D1.2 lead (GPAI) produced a template by 6th May. After a brief discussion the structure was agreed and by 17th May the D1.2 leader (GPAI) started to collect data from labs. All lab scientific coordinators had submitted the requested inputs as of 31st May 2022, and the deliverable was expected by June. The deliverable had not arrived by December. Several reminders were communicated via email and during the project monthly meetings. During the PSC meeting in December 2022, it was decided that if the deliverable had not arrived in one month, the Consortium would explore the reallocation of resources from GPAI to another partner to produce the deliverable. Partners were also asked to update the inputs, which had been initially prepared by 31st May 2022, to the situation in labs as of December 2022. D1.2 was submitted by GPAI by 12 December, and it was sent back

to GPAI for review after an internal quality check conducted by INRAE, GECOS and USAL. D1.2 was finally published in January 2023.

Lessons learned

During the Project Steering Committee (PSC) meeting in December 2022, it was agreed by the PSC that the contingency planning designed for D1.2 would be applied to other deliverables when delays realize. If the delay remains unaddressed by the deadline set by the PSC in the contingency plan, the PSC will be called again and reallocation of resources among partners explored, so that other partner can take over the deliverable.

Engagement has been successful over the first two years of the project, but further action is needed to further cement this success. The collectively agreed and managed (building on D1.1—Terms of Reference for the Stakeholder Platform and Talanoa Dialogue) but individually implemented stakeholder engagement activities are prone to several management issues such as delay in engaging stakeholders or in receiving relevant inputs from those stakeholders, necessity to update the composition of the Stakeholder Platform, change of rapporteur, etc. For these reasons, TALANOA-WATER has defined several contingency measures to address possible issues arising during stakeholder engagement, while ensuring that the Grant Agreement is entirely fulfilled, and impact of the project maximized.

5.1.2. WP2 DATA - Data gathering and water accounting

Description of deviation and contingency planning

-Task 2.1 DATABASE: Hydrologic, micro-, macro-economic, agronomic, and climatic database. The Hydrologic, micro-, macro-economic, agronomic, and climatic database is complete, but some (minor) issues regarding its findability and accessibility remain. By month 7 (date of delivery of this database), **t**he Cega (USAL), Litani (AUB) and Po (GECOS, CMCC) labs had produced complete databases; however, some gaps persisted in the Lower Nile (GPAI), Aude (INRAE) and Jeffara (INAT). These gaps were related to the findability and accessibility of the data: while data sources were correctly identified and accurately described, some links were missing or did not work. To address this gap, contingency planning was issued by month 8. First, AUB and USAL repeated the data availability check carried out during the preparation of the proposal in those labs where data gaps existed. The new data availability check revealed that all necessary data was available in accessible repositories/hosted by stakeholders committed to the project, and confirmed that persisting data gaps were related to indexation issues rather than missing data inputs. A new deadline for uploading and indexing all data inputs was set by December 2022, at which point the Jeffara lab (INAT) provided all necessary inputs. By month 24 the Consortium, led by INRAE, conducted a thorough review of D2.1 and data availability and metadata provided. The review concluded that the Lower Nile lab and Aude lab had addressed all gaps by month 24.

-Task 2.2 ACCOUNTING: Comprehensive water accounting estimates of water use. The Water Accounting Database encountered deviations in terms of the methodology used to obtain the water balance. Initially, the project envisioned a unique methodology for the water accounting method through WaPOR and Water Accounting +. However, initial interactions with stakeholders and scientists revealed a preference towards adopting, and where necessary improving, existing water accounting methodologies

already in use in the water labs. This request aligns well with TALANOA-WATER principle of producing *actionable* science, and was eventually followed. Thus, while the WaPOR and Water Accounting + methods were adopted in the Litani (AUB) lab and Nile lab (GPAI), alternative water accounting methods were adopted in the remaining labs. It should be noted that the data necessary to run WaPOR is not readily available in EU catchments, which reduced the actionability of this approach for EU labs and would have consumed significant amounts of resources to produce a model that is not wanted by stakeholders.

In the Aude (INRAE) water needs for crop irrigation and water accounting were estimated using the SIMETAW model using inputs from the THEIA satellite data service (theia-land.fr). In the Po lab (CMCC, GECOS), following input from the Stakeholders, the lab adopted a data driven method that downscaled the modeled discharges provided by ARPAE (which is also a stakeholder in the Lab) and CMCC, using local historical data recorded at the ARPAE discharge monitoring station "Lugo"', located upstream of Castellano Weir. This approach was preferred as it is easily reproducible in other similar contexts across the basin and elsewhere in Italy. There was also interest in getting strategic information on the duration and frequency of water extremes (particularly drought) that daily output can provide (also by means of lumped representation as Flow Durations Curves). In the Jeffara lab (INAT), WaPOR was initially tested, but the exercise was not successful in providing a reliable water accounting estimate through Water Accounting +. Alternatively, a classical approach was adopted where water accounts were developed combining statistics on demand with hydrogeology, hydrology, climate, water quality and geographic information data. This approach has been used consistently in the area over time and results could be compared with previous water accounting exercises, offering a dynamic analysis which was seen as advantageous by local stakeholders. In the Cega lab (USAL), AUB and USAL adopted an alternative approach to WaPOR, for which data is not available in the EU, and implemented a global 30-m ET model (HSEB) using harmonized Landsat and Sentinel-2, MODIS and VIIRS. The model, called hybrid single-source energy balance (HSEB), has been developed by AUB. This approach was complemented with an alternative water accounting exercise using the model Hidromore developed in the context of previous and ongoing EU projects (Calera et al., 2017; Garrido-Rubio et al., 2020). This will allow researchers from USAL to sample uncertainty in water accounting estimates in modeling exercises in WP3. The adoption of these methodologies resulted in a delay in the production of the water accounting data, which was completed for all labs (except Lower Nile) in month 20. By month 24 the Consortium, led by AUB, conducted a thorough review of D2.2 and data availability and metadata provided. It was concluded that the Lower Nile water accounting exercise (led by GPAI) had produced a detailed description of the objectives of the accounting exercise, yet it did not offer Water Accounting + outputs or preliminary results. A clear explanation of the process to produce water accounting was also missing. This information was requested by AUB and the project Coordinator following the review of D2.2 ahead of the General Assembly held in Salamanca (31st May-1st June 2023), and again by the Project Coordinator via email. A response was received by 26 June in which the following paragraph was added to the test: "The FAO WaPOR database for the period 2009 to 2020 were used to perform a simple and rapid water accounting analyses of the Meet Yazid canal Command Area (MYC). The study concluded that for the period 2019 to 2020 the evapotranspiration (ETa) is greater than the precipitation (P) except for year 2016. The resource base water accounting sheet one was developed and presented in Figure 23." Results were presented using average values instead of providing yearly outputs. This was deemed insufficient by both the Coordinator and AUB, who asked for further corrections. The objective is to offer information on the WaPOR and Water Accounting + outputs during year 3.

As a result of the above, the databases produced in the context of tasks 2.1 and 2.2, both of which were set to end during the first year of the project (month 12), have transitioned from a static document (as planned in the original project proposal) into a **"living document"**. This living document will be updated

periodically to account for stakeholder requirements and feedback during model co-development, which has already demanded (and may demand again in the future) the incorporation of new modules/systems and/or models (e.g., transitioning from WaPOR and Water Accounting + to alternative/complementary water accounting frameworks). Addressing stakeholder demands during co-generation is a key aspect of TALANOA-WATER and necessary to deliver *actionable* science that can be readily used by stakeholders, also beyond the lifetime of the project. Since the addition of new modules/systems and/or models in turn demands gathering and processing additional data, transitioning to a living document is a logical course of action that will allow us to account for updates in databases in model calibration and simulation. Moreover, use of a living document will allow us to update inputs more easily for those models where relevant updates are applied to key databases.

Lessons learned

Each TALANOA-WATER lab database is developed independently mostly by one partner organization (lab coordinator), under the close leadership of the WP2 lead and co-lead and with assistance/guidance of the other thematic WPs (especially WP3 and WP4). The collectively agreed and managed but individually implemented data gathering and processing efforts are prone to several management issues such as delay in receiving relevant input from those stakeholders keeping data, necessity to changing the eventual scope of the modeling framework alongside data needs if more beneficial for the users (e.g. users identify over the workshops a new module/model they want to explore), etc. For these reasons, it is necessary to design for and maintain some flexibility in the specification of the modeling framework and data collection. At the same time though, it is critical to ensure that the Grant Agreement has been entirely fulfilled and impact of the project has been maximized. To balance these two aspects, we have made databases in T2.1-2 "living documents" that will be updated as co-generation activities in WP4 advance, and we have enacted contingency planning to ensure fulfillment of Grant Agreement objectives and impacts.

5.1.3. WP3 MODELING - Actionable socio-hydrology science

Description of deviation and contingency planning

-Task 3.2 IMPACTS: Modeling transformational adaptation impacts on human and water systems. Some labs failed to have their database fully operational by month 12 (see previous subsection on WP2). This has not affected progress in WP3, although some deviations occurred. Contingency planning (specified in the Grant Agreement) was implemented to ensure that delays in data collection did not translate into delays in the modeling framework. To minimize the impact of delays in data collection on modeling activities, the TALANOA-WATER Project has built a modular structure for WPs and labs. This makes possible to concentrate resources in some tasks/simulations and/or labs for which there are no barriers (in this case, water accounting data) impeding progress, thus advancing more rapidly in these tasks/labs to later reallocate efforts towards delayed tasks/labs and more quickly advance here. We have built on this contingency planning to produce complementary and corrective actions that ensure delays are rapidly accommodated.

Lessons learned

The modular nature of the project makes possible to concentrate efforts in those labs where data is already available. This allows for example to develop key processes and programming codes in labs where data is available, which can be then tested and more quickly adapted and applied to other labs as soon as data gaps are filled in. Accordingly, initial efforts in T3.2 in those labs where water accounting data was not available have been focused on simulations not requiring such data. In the Cega, Litani and Po labs where all data needs have been met, initial tests have been run to assess performance of the full-fledged modeling framework, allowing us to early identify and address possible caveats and gaps, automate calibration and coding, and build valuable mechanistic and heuristic knowledge that paved the way towards a quicker setup of comparable simulation efforts in the remaining labs.

5.1.4. WP4 LABORATORIES - Pilot water laboratories

Description of deviation and contingency planning

-Task 4.1 PLATFORM: Platform for coordinated and harmonized implementation of the ecosystem of innovation in water laboratories. Deliverable D4.1, due in month 11, was internally submitted by month 11 (M4.1), but its final version was produced with an 8-month **delay** (month 19). The delay has been caused partly by the task leader's (INRAE) resource constraints, partly by the complex nature of the task. The draft deliverable (M4.1) was produced in time (month 11) but after internal review, the WP lead organizations (INRAE, INAT) decided to postpone the submission to add relevant additional contents and implement revision. A key member of INRAE's staff resigned just ahead of the beginning of work in T4.1 and it could be only replaced in May 2022, which meant most workload fell on a single person (INRAE's PI). Besides, in some labs partners have experienced difficulties to address tasks in WP1-3, which has caused delays in producing the guidance document. D4.1 final version was submitted in month 19. From month 11 to 19, the initial version of the deliverable, whose structure was approved by reviewers and the coordinator, was available in the project cloud drive to guide initial work in labs, identify potential caveats in the document and guidance, and collectively work towards addressing them.

-Task 4.2 LABORATORIES: Pilot water laboratories. The organization of the first round of local science-policy workshops was delayed by up to 2 months in some labs. This happened because of the delay in the start of the TALANOA-WATER project, which was caused by the failure of one of the initial partners (the National Water Research Centre in Egypt) to obtain approval from the Water Ministry of Egypt to sign the Grant Agreement. As a result, the local workshops that were originally planned to take place in month 14 coincided with the month of July, when key stakeholders in several labs were unavailable to attend the workshops. Thus, during the May 2022 monthly meeting, lab coordinators asked the Project Coordinator to postpone meetings by up to 2 months' time. Following a consultation with the Project Officer, this permission was granted, and all workshops took place in month 16, except the local science-policy workshop of the Lower Nile Lab which was held in May 2022 (month 12).

Lessons learned

Management of six water labs is a challenging task, given the multitude of different stakeholders, challenges, scopes, purposes, and intended audience. WP4 strategy to cope with this challenge worked out well in general, thanks to sound guidance and monitoring strategy put in place and long-lasting experience

of the WP4 lead (INRAE) and co-lead (INAT), as well as the project coordinator (USAL). The adopted approach offered flexibility to lab coordinators to adapt the timing of meetings and workshops within reasonable limits, in compliance with the Grant Agreement objectives and after consulting the project officer.

To further develop synergies in research and stakeholder engagement, the T4.1 Platform agreed to organize joint meetings in collaboration with other projects and consortia. Joint workshops were organized under the condition that TALANOA-WATER was acknowledged as the main project in all dissemination products. Joint meetings have been successful in amplifying outreach and impact. This is aligned with the Grant Agreement, which calls for partners to leverage on their comprehensive expertise *and networking capacity* to maximize the policy leverage of the project and its activities.

5.1.5. WP5 EXPLOIT - Exploitation, dissemination and communication

Description of deviation and contingency planning

WP5 did not encounter any major implementation difficulties. As a minor obstacle, the translation of the Water Agora hub to Arabic led by GPAI has not been finished for all subsections of the website and app but is expected to be ready ahead of the international workshop in September 2023. Contacts with the ISIMIP network to explore synergies in WP3 were initially unsuccessful due to the limited resources available by ISIMIP coordinator to work on the topic at the time, but eventually led in month 22 to a joint proposal between USAL and PIK (ISIMIP coordinator) with the goal of mainstreaming TALANOA-WATER modeling framework into ISIMIP's multi-system ensemble (Water JPI *Water4All* 2023 call). Most project dissemination activities were conducted by the project coordinator (USAL), and the coordinator used most of the resources available. Further dissemination efforts in southern and eastern Mediterranean countries were asked then to GPAI relying on its dissemination funding (GPAI is the only partner other than USAL with allocated resources towards dissemination). However, during the First General Assembly of TALANOA-WATER, GPAI communicated that all its dissemination funding had been already consumed in 3 courses (five days each) and three field trips (1 day each) for the training of stakeholders in the Lower Nile water lab, without communicating this activity to the coordinator or any of the other partners. GPAI agreed to conduct with its own resources the translation of the website and a video in Arabic for the project, which are both still pending.

Finally, several of the institutions in the Consortium have signed transformational agreements with publishing houses (Elsevier, Wiley) and as a result the budget item for open access has been made redundant. Open access has been reallocated to various activities depending on the partner, following a consultation with the project officer. The reallocation of these resources is described more in detail in Section 5.2.

Lessons learned

We don't envisage any major risk compromising achievements of the impacts laid down in the Grant Agreement (GA). Nevertheless, we have designed corrective and supplementary actions to ensure WP5 implementation remains on track. These are described in Part A of the technical report. WP5 lead and co-lead have ensured and will ensure adequate participation and contributions of all WP5 partners, including

a balanced use of available financial and personnel resources; and have provided and will continue providing a regular evaluation of WP5 related (key) performance criteria in the 12-month exploitation, dissemination and communication reports (D5.3-6).

Dissemination activities by GPAI through a video and the translation of the website to Arabic will need to be mobilized in the following 2 years to consolidate the ambitious exploitation plan, achieving a high graphical layout and with tailor-made content for the TALANOA-WATER project. This is critical to further increase the number of inspiration labs, with a focus on the Southern Mediterranean area, where no inspiration lab has been established yet.

5.1.6. WP6 COORDINATION

Description of deviation and contingency planning

-Task 6.1 START: Kick-off meeting, consortium agreement, inception report and roadmap, and initial implementation activities. T6.1 did not encounter any significant obstacle. During the signature of the Grant Agreement, one of the original partners included in the proposal, the National Water Research Centre in Egypt, had to be excluded from the Consortium due to failure to obtain approval from the Water Ministry of Egypt to sign the Grant Agreement in time. The resources of this partner were reallocated to partners based on their expertise, with the largest share being transferred to the other Egyptian partner (GPAI) to support work in the Egyptian lab. This change is reflected in the Grant Agreement.

T6.2 COORD (Project coordination and management) and **T6.3 CONTINGENCY (Assessment of the risk of delays in the project and contingency planning).** T6.2 encountered some minor obstacles that led to deviations from the proposal submitted in terms of the day-to-day organization of the project, but did not have an impact on the project outcomes and outputs. The kick-off meeting initially planned to take place in Salamanca could not be held in person due to the COVID-19 emergency of summer 2021. This eventuality had been anticipated as one of the critical risks of project implementation, and as per the contingency planning described in the Grant Agreement, the kick-off meeting was held online. As a result, the resources allocated to this kick-off meeting were not used. In addition, some partners have signed transformational agreements with publishing houses and as a result open access funding for papers were made redundant.

Some minor and recurrent issues have emerged regarding the coordination with GPAI and the Nile water lab. In email communications between the PC and the GPAI PI and project manager (PM), these issues have been attributed by GPAI PI and PM to the political tensions surrounding water management in Egypt due to the construction of the Grand Ethiopian Dam. The General Assembly of month 12 was initially planned in Cairo (Egypt). However, due to the above-mentioned political tensions, GPAI communicated the PC and PSC that any event on this topic needed formal approval from the competent ministry before it can be held, and this approval did not arrive in time. This eventuality was anticipated in the contingency planning, which timed General Assemblies to allow for delays of up to 6 months. During its meeting of month 12, the PSC decided to have the Cairo General Assembly in month 17 during the Conference of the Parties that took place in Egypt, but again formal permission from the relevant Egyptian ministry did not arrive in time. Accordingly, the General Assembly was organized at the premises of INRAE in Montpellier in month 18 (initially planned to host the General Assembly of month 24), and the General Assembly of Cairo postponed to month 24 to give time for the permission from the ministry to arrive. All participants attended in person the General Assembly of month 18, with exception of GPAI, whose representative

cancelled his participation the day before due to health issues. A GPAI representative participated online in the meeting. The representative from GECOS connected online during the first half of the first day due to a plane strike that delayed his flight, and attended in person the rest of the meeting.

In the General Assembly and PSC meeting of month 18 in Montpellier it was decided that if no approval had arrived by month 24, the PSC would ask the Project Officer to reallocate the resources of the Cairo General Assembly from GPAI to CMCC to meet in Venice instead.

Following the PSC meeting, the project coordinator had an email exchange with the project officer, and the following proposals made by the PSC meeting were approved in 1/06/2022:

> "1-Some partners have signed transformational agreements with publishing houses and as a result open access funding for papers are not any longer necessary (4500 EUR per partner). The PSC proposed to use these resources from open access for travelling (mainly across labs, so as to strengthen collaborations between partners) and training events towards enhancing stakeholder engagement (group dynamics and event organization).
>
> *GPAI has communicated to the PSC that due to the situation in Egypt/Ethiopia with the Grand Ethiopian Dam, they need a formal approval from the Ministry to organize events related with water. The PSC proposed to:*
>
> 2a-Organize the first General Assembly in France, instead of El Cairo, which will host the General Assembly in the following year (initially planned in France).
>
> 2b-If by the delivery of the second progress report (month 24) no formal approval from the Ministry has arrived to organize the General Assembly in El Cairo in 2023, shift the organization of the General Assembly and the allocated budget to that General Assembly to another partner (possibly CMCC in Venice).
>
> 3a-Organize the first International Workshop (meeting of stakeholders from all water labs) in Tunisia in month 25 and the second one in Egypt in month 43 (initially the first one was planned in Egypt in month 25 and the second in Tunisia in month 43).
>
> 3b-If by the delivery of the second progress report (month 24) no formal approval from the Ministry has arrived to organize the international workshop in El Cairo, shift the organization of the international workshop and the allocated budget to the organization of this international workshop to another partner (possibly AUB in Beirut).
>
> 4- Since the kick-off meeting was organized online due to the COVID emergency and as per the TALANOA-WATER contingency plan, the PSC has proposed to organize an additional in person General Assembly in Salamanca the 3rd or 4th year of the project (where activity is expected to be more intense) using resources initially allotted to the Kick-off meeting held online."

GPAI confirmed in month 19 that the General Assembly and International Workshop in Egypt were feasible, and preparations for the General Assembly have already started. Due to the weather conditions in Egypt during May/June (the agreed time to hold the 2nd General Assembly Meeting in Cairo), GPAI asked to activate contingency planning and postpone the second General Assembly to December 2023. To avoid any delay in the planning of the project in this critical period, the PSC decided to use the resources of the kick-off meeting held online by USAL to have an in-person PSC meeting in Salamanca in month 24. The

PSC will reconvene back-to-back the International Stakeholder Workshop in October 2023 (to be held in Jeffara, Tunisia) and in January 2023 (month 31) during the Cairo General Assembly.

In order to discuss some issues of the mid-term report, the PSC met online during the monthly meeting of month 23, and in person during the General Assembly of Salamanca in month 24. The PSC leveraged on both meetings to conduct a critical assessment of the project progress and deviations, which is reported in these pages, and revise and update collectively the contingency planning. All partners participated in both events, except for GPAI, which alleged that one of its members had health issues and that GPAI had not received the invitation for the event due to a malfunction of the mailing list (it should be noted that formal invitation letters were sent from the Project Manager to GPAI representatives' personal emails, on top of those using the mailing list, and that the event had been announced in the precedent monthly meetings). During the General Assembly, the PSC expressed concern over the limited engagement of GPAI, which thwarted coordination with other partners, including the coordinator. The PSC also expressed concern over the minor yet recurrent delays experienced in the Lower Nile Lab (GPAI) in WP1, WP2, WP3 and WP5. These delays had been critically assessed and partially addressed following the Montpellier General Assembly in month 19, but some persisted as of month 24. This coordination issue and the (still minor and solvable) delays observed in WP1, WP2, WP3 and WP5 need to be addressed. The PSC asked the PC to set a meeting with the Project Officer and GPAI's PI and PM, as well as key WP leaders (WP2, 3 & 4), after the mid-term review.

Lessons learned

To better monitor project progress, the PSC has held regular web-conference (every six months) meetings and, as per the Talanoa Dialogue principles of trust and transparence, the videos, minutes, and key agreed actions have been made openly available online and summarized in the progress report deliverables. This allows anyone interested to check and verify the information on coordination aspects described above.

5.2. Use of resources

We present below a series of bullet points that describe the main deviations in the use of resources from the proposal initially submitted.

-In a communication with the Project Officer the 13/05/2022, the PC informed that the local workshops that were originally planned to take place in month 14 coincided with the month of July, when key stakeholders in several labs were unavailable to attend the workshops. Thus, during the May 2022 meeting of the T4.1 Platform lab coordinators agreed to ask permission to postpone meetings by up to 2 months' time. This permission was granted.

-In a communication with the Project and Financial Officers the 03/06/2022, the PC informed both that some partners have signed transformational agreements with publishing houses and as a result open access funding for papers were no longer necessary (4500 EUR per academic partner: USAL, AUB, CMCC, INRAE, INAT). The PSC proposed to reallocate these resources from open access for traveling (mainly across labs, to strengthen collaborations between partners) and training events towards enhancing stakeholder engagement (group dynamics and event organization). The Financial Officer approved this

reallocation. INRAE open access resources were partially reallocated to organize a training session on serious games at Montpellier during the General Assembly of December 2022.

-In a communication with the Project and Financial Officers the 03/06/2022, the PC informed both that GPAI has communicated to the PSC that due to the situation in Egypt/Ethiopia with the Grand Ethiopian Dam, they need a formal approval from the Ministry to organize events related with water. The PSC asked the Project and Financial Officers permission to:

> 1a) Organize the first General Assembly in France, instead of El Cairo, which will host the General Assembly in the following year (initially planned in France);
>
> 1b) If by the delivery of the second progress report (month 24) no formal approval from the Ministry has arrived to organize the General Assembly in El Cairo in 2023, shift the organization of the General Assembly and the allocated budget to that General Assembly to another partner (possibly CMCC in Venice);
>
> 2a) Organize the first International Workshop (meeting of stakeholders from all water labs) in Tunisia in month 25 and the second one in Egypt in month 43 (initially the first one was planned in Egypt in month 25 and the second in Tunisia in month 43);
>
> 2b) If by the delivery of the second progress report (month 24) no formal approval from the Ministry has arrived to organize the international workshop in El Cairo, shift the organization of the international workshop and the allocated budget to the organization of this international workshop to another partner (possibly AUB in Beirut).

Permission was granted by the Financial Officer.

-In a communication with the Project and Financial Officers the 03/06/2022, the PC informed both that since the kick-off meeting was organized online due to the COVID emergency, as per the TALANOA-WATER contingency plan, the PSC had proposed to organize an additional in person General Assembly in Salamanca using resources initially allotted to the Kick-off meeting held online (EUR 4 250). Permission to reallocate these resources was granted by the Financial Officer.

-In a communication with the Project Officer the 07/06/2022, the PC informed the Project Officer that AUB, which had allocated 11 PMs to WP2 (which they lead) in year 1, would like to redistribute some of them to the following year(s) to continue working on WP2 (whose end was timed for month 12). This is because some further data processing and curation in the "living document" (see Section 5.1.2) may be needed after month 12 since some data, particularly data from stakeholders, has not been received yet. This reallocation was foreseen in the contingency plan of the GA, where it is mentioned that the modular structure of the project allows partners to reallocate resources over time to meet project objectives without delaying work in other WPs. The Project Officer accepted the reallocation of PMs along time and within WP2.

-Furthermore, a clarification was asked to the Financial Officer to determine whether field trips, personnel exchange, and stakeholder meetings outside of workshops were eligible costs. These activities are explicitly mentioned in Table 2.2.c of the proposal but not in the budget, which just mentions travel, events, and outreach in the description of the budget item. INAT and USAL financial project managers requested their PIs for an explicit statement from the Project Officer clarifying that field trips and personnel exchange costs mentioned in table 2.2.c were eligible traveling costs. In case field trips were not eligible as travel costs as per PRIMA policies, the PC requested the Financial Officer for a reallocation of about 7000 EUR of the

traveling budget (EUR 18000) of INAT towards car rental for field trips for staff members and students working for the TALANOA-WATER, since the Jeffara water lab is located 500 km away from INAT headquarters and poorly connected. The Financial Officer confirmed the 14/06/2022 that field trips, personnel exchange, and stakeholder meetings other than workshops were eligible costs, and thus the reallocation was not necessary.

-Flexibility in the organization of local workshops is needed to meet the needs of local stakeholders and adapt to local conditions. Accordingly, in those places where one annual workshop was deemed insufficient to address all project objectives, notably because previous collaboration with stakeholders had been more limited (French case), or where available resources due to favorable exchange rates made possible the organization of additional events to further cement science-policy collaboration (the case of Tunisia), the PSC and T4.1 Platform agreed (with the acquiescence of the project officer) to split the 4 planned workshops in more workshops where needed, provided it did not change the scope and did not delay the achievement of workshop targets. As of month 24, all labs have organized 2 workshops each, as planned. The modification has been nonetheless approved and could be implemented during the second half of the project.

5.2.1. Unforeseen subcontracting

Not applicable.

5.2.2. Unforeseen use of in-kind contribution from third party against payment or free of charges

Not applicable.

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