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PRIMA-SECTION 2-2022

"Modelling and Technological Tools to Prevent Surface and Ground-Water Bodies from Agricultural Non-Point Source Pollution Under Mediterranean Conditions"

NPP-SOL

NPP-SOL Dissemination and know-how transfer report with updates (M36)

Deliverable number: D5.2

Project Acronym: NPP-SOL

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Type of Action: Multi-topic Topic 2.1.1 RIA (Prevent and reduce land and water salinization and pollution due to agri-food activities).

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1. Introduction

Executive summary

The present document is the third **Dissemination and know-how transfer report (M 36)** of the NPP-SOL project, which is funded by the PRIMA programme supported by the European Union. It outlines the activities implemented in the framework of the **WP5 Dissemination and Communication** and the achieved results over the first 36 months of the project's execution.

This period was initially marked by the official launch and inception phase of the project with a particular focus on **planning** and **coordination** activities, as well as the development of the **modelling tools** and the **technologies** (*bioreactors, constructed wetlands* and *anaerobic digesters*) to be used in the four case study areas. In the **second year**, communication and dissemination efforts significantly intensified. Alongside the consolidation of strategic communication tools and channels – including the **project website**, the publication of **news** and updates on **social media** – the focus shifted toward showcasing project results and engaging with a broader network of stakeholders. Notably, the establishment and operationalisation of **Local Hubs** in each of the four case study areas and at Partner level (in Israel, Italy, Morocco, Spain and France) have played a key role in promoting participatory dissemination and active stakeholder involvement.

In addition to the Local Hubs, that have become crucial spaces for dialogue and co-learning, the communication activities also tackled **events organized jointly with other PRIMA projects**, such as info days, networking events, field visits, and capacity-building activities targeting both institutional actors and end-users.

In these occasions, additional tailor-made communication and dissemination material (such as **banners, agendas, posters, flyers** etc.) have been provided to Partners in order to increase the reach, impact, and visibility of the events concerned.

Additionally, the project released several thematic **factsheets**, **newsletters**, and **videos** including updates and highlights on the research activities and field missions, as well as interviews from the local stakeholders, further contributing to visibility and outreach.

Scientific dissemination has also progressed, with increased participation in conferences and the publication of peer-reviewed articles during 2026. These efforts align with the overarching objective of enhancing the impact of the project's outcomes at local, regional, and Mediterranean levels.

In the period **January–September 2026**, which is covered by this update, communication and dissemination activities further increased, with a clear shift from the presentation of the project's approach to the dissemination of its results. The **Local Hubs** set up in the four case study areas – Arborea (Italy), Lerma (Spain), Nahalal (Israel) and Gharb (Morocco) – have continued to operate as permanent channels for the involvement of local stakeholders, including farmers, water users associations, drainage and river basin authorities, extension services and environmental agencies, ensuring that the results generated by the project are discussed with the actors expected to adopt them.

Over this period, project results were presented at **16 international scientific conferences**, congresses and workshops held in Austria, Greece, Hungary, Italy, Spain, France, Israel, Malta, Morocco and Türkiye. These included the EGU General Assembly 2026 (Vienna), the IAH 2026 World Groundwater Congress (Budapest), the 19th IWA International Conference on Wetland Systems for Water Pollution Control (Chania), the CMWR 2026 Conference on Computational Methods in Water Resources (Bologna), the Iberian Groundwater Congress CIAS 2026 (Barcelona) – where an NPP-SOL contribution received the **AIH-GE Young Researchers Award** for the best oral presentation – and the IFSA 2026 Conference, organised and hosted by CIHEAM Montpellier.

Engagement with local stakeholders was further strengthened through dedicated participatory events, such as the Riverine–Agriculture Best Management Practices Workshop held in Israel in June 2026, co-organised by the Ministry of Agriculture and Food Security and AGMA – Israel Center for Watersheds and Rivers, which gathered 60 registered participants (21 of whom women) among farmers, river basin authorities, soil conservation specialists, researchers and policy makers around round tables devoted to on-farm solutions for non-point source pollution.

Scientific production also consolidated: an open-access peer-reviewed review article on integrated bioreactor and wetland-based approaches for agricultural drainage treatment, was published in March 2026, the two companion articles presenting the FLOWS model were released in Engineering with Computers, the second one published in open access in October 2026 and the first one in press, and a further article, on the coupled modelling framework for the design of agricultural bioreactors, is currently under review in a journal special issue.. In parallel, a new version of the **FLOWS agro-hydrological model**, featuring a web-based interface and new modules for crop growth, ponding and exchange with the surrounding groundwater table, was released, applied to all four case studies and made available online, together with its handbook published in open access.Scientific dissemination has also progressed, with a marked increase in the participation in international conferences and with the first peer-reviewed articles published, accepted or submitted during 2026. These efforts align with the overarching objective of enhancing the impact of the project's outcomes at local, regional, and Mediterranean levels.

Further details can be found in the following pages.

2. Activities carried out in the framework of WP5

In the following paragraphs of this report, the activities carried out in the framework of **WP5 Dissemination and Communication** are listed and described, along with the major outputs, deliverables produced and impacts reached.

2.1 The NPP-SOL Outward Strategy (*WP5, TASK 1, D 5.1)*

In the framework of the activities of WP5 aimed at maximizing the impact of NPP-SOL project's activities and results, the **Outward Strategy Plan (D 5.1)** has been elaborated and shared with all Partners.

The strategy was structured following the *WHY, WHO, WHAT, HOW, BY WHOM, WHEN* and *WHERE* approach and provided a detailed description of the methodology and tools to be used in order to raise the interest of the target audience and stakeholders toward the technologies, solutions, and knowledge that will be produced by the project.

In particular, the document included:

- the **tools** and **channels** to be used to the achieve strategic communication objectives and to ensure the spreading of projects results;
- the identification of the **target audiences** to be addressed;
- **Strategic aspects,** peculiar to the project, to be considered for the communications/dissemination activities;
- **Guidelines** addressed to project partners to contribute to communication activities and to ensure a proper dissemination of project results, as well as the **actions to support SE and farmers** in the adoption of the tools, technologies and agro-hydrological practices developed by the project.

Moreover, the Outward Strategy established all the indicators (KPI) and the measures to monitor and evaluate the success of the dissemination and communication activities.

In order to acquire useful information, a preliminary ***communication and dissemination assessment survey*** has been submitted to all Partners to acquire **strategic information** and **data**, relevant for the development of the communication and dissemination activities.

The **Outward Strategy Plan**, uploaded on the project's repository, is available at the following LINK

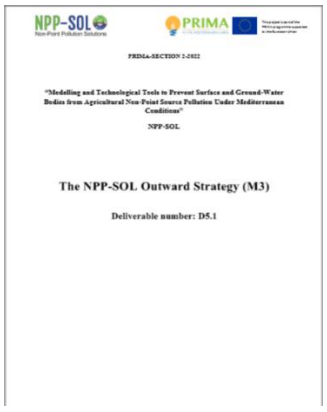


Fig. 1. NPP-SOL Outward Strategy Plan cover page

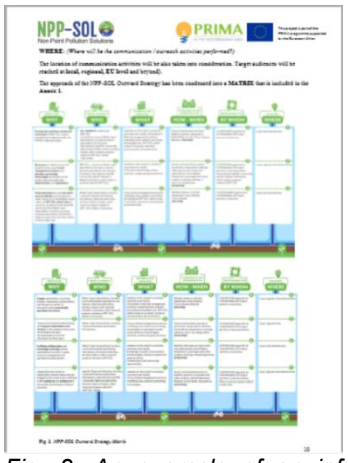


Fig. 2. An example of an infographic included in the strategy

2.2 Kick-off meeting brochure



A **brochure** has been elaborated at the very first stage of the NPP-SOL project, in order to present its activities, objectives, case studies and to **launch the Kick-Off meeting** held from 6 to 8 November 2023 at the "Cittadella Universitaria di Monserrato" of the University of Cagliari.

The brochure is available on the project's website at this LINK

Fig. 3. NPP-SOL Outward Strategy Plan cover page

2.3 - Visibility materials

Visual Identity Kit

A set of graphic **logos** and a **visual identity** presentation have been elaborated to represent and convey the image of the NPP-SOL project (Figures 3 and 4). The logo features a pictogram that visually represent the thematic areas related to the project.

NPP-SOL
Non-Point Pollution Solutions

Fig. 4. *Project logo*

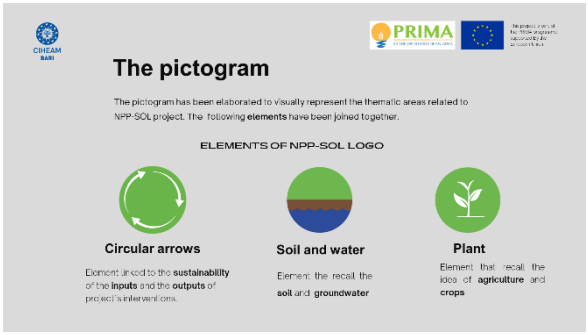


Fig. 5. *Project Visual Identity*

The files of the logo and all its variations, have been shared with Partners through the project's repository in the specific folder "**Promotional material**" (accessible through this LINK).

Suggestions and guidelines on the usage of the logo, have also been provided in the presentation of the **NPP-SOL visual identity.**

NPP-SOL communication materials (that have been also uploaded on the project website in a dedicated page "**Communication Kit**" (https://npp-sol.iamm.ciheam.org/communication-kit/).

LEAFLETS

These materials also include the NPP**-SOL leaflet** that will be used to promote the project during conferences, trainings or digital events. The product has been originally elaborated in english, but multilingual versions of the leaflet are now available:

- NPP-SOL Leaflet **(English version)**
- NPP-SOL Leaflet **(Spanish version)**

- NPP-SOL Leaflet **(Hebrew version)**
- NPP-SOL Leaflet **(Italian version)**

- NPP-SOL Leaflet **(French version)**

The leaflet is structured in a double-sided A4 format (easy to be shared online or printed) and provides essential information about the NPP-SOL project's objectives, partnership, approach, technologies and case studies.

In addition, a **tailored leaflet** has been elaborated (in English, French and Arabic) at the occasion of the **Information Day**, held in **Morocco** on **November 13, 2025** "*Role of good agricultural and water management practices*".



Fig. 6. *NPP-SOL Leaflet in English*



Fig. 7. *NPP-SOL Leaflet for Information Day in Morocco*

POSTERS

As for the **posters**, a **general poster** (Fig. 8) has been developed and printed by CIHEAM Montpellier including general information and objectives of the project, as well as a description of the activities to be carried out.
The poster has reached approximately 120 people and has been uploaded on the project website at this **LINK**.

Thematic posters have also been developed to contribute to visibility and outreach, providing clear and accessible information on key project outcomes and results (see posters of Spanish – fig. 9 - and Moroccan – fig. 10 - case studies)

During the third year, two further materials elaborated by the Spanish Partner (Universitat de Barcelona – MAiMA research group) were uploaded in the Project Materials section of the project website. They are the **extended abstracts** of the two contributions presented at scientific conferences, reporting the results of the biostimulation experiments at the Lerma constructed wetland: "*Denitrification Stimulation Improves Agricultural Runoff Water Treatment in a Constructed Wetland as Revealed by Isotopic Analysis: comparison between two electron-donors*" and "*Isotopic assessment of nitrate removal in constructed wetlands: comparison between continuous and intermittent flow operation under whey-mediated biostimulation*".

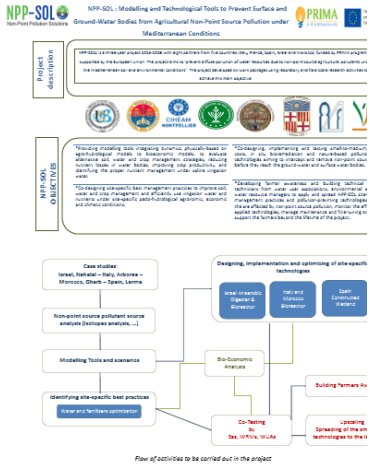


Fig. 8. *NPP-SOL Poster*



Fig. 9. *NPP-SOL Poster*



Fig. 10. *NPP-SOL Poster*

SOCIAL CARDS

To support the effective outreach of the project toward o more general audience, **a set of 7 social media Cards** were also developed. They are designed to briefly present the NPP-SOL project, introduce the environmental issues addressed by this initiative and case studies features in a visually appealing formats suitable for both printing and online sharing, enhancing the overall communication impact of the project:

- NPP-SOL Social Card Case study in Italy (ENG version)
- NPP-SOL Social Card Case study in Italy (ITA version)
- NPP-SOL Social Card Case study in Spain
- NPP-SOL Social Card N. 1
- NPP-SOL Social Card N. 2
- NPP-SOL Social Card N. 3
- NPP-SOL Social Card N.4



Fig. 11 Example *of social card*



Fig. 12. *Example of social card*



Fig. 13. *Example of social card*

2.4 - NPP-SOL Project Public Website (Milestone 5)

NPP-SOL public website, which is one of the primary sources of information about the project, has been built and shared with all Partners at month 9 (July 2024).

The link of the website is: https://npp-sol.iamm.ciheam.org/



Fig. 14. *NPP-SOL website - homepage*

Its contents include news, events, public deliverables, scientific publications and the material used in the events where the project is presented (such as slides, videos, etc.). It will be kept updated on a regular basis with the information coming from inside and outside the Consortium, acting also as a dissemination tools. NPP-SOL website will showcase contents and information thanks to a clear and accessible design / structure.

In line with the project's visual identity (*ref. 3.2 - Project Visual Identity Kit*), the website's graphic layout includes all the elements necessary to comply with the general rules for communication and dissemination activities of projects funded under the PRIMA Foundation programme.

The **top navigation bar** includes: the project title and the link to the main social channels and the logo of the project. The **menu bar** gives access, in addition to the home page, to the main web sections: About the project | Pilot areas | Resources | News & Events | Contacts.

The structure of the website includes the **HOMEPAGE** (Fig.13), and a **top navigation bar** linking to several other sections:

- '**About the project**': provides an overview of the project including its objectives, methodology, technologies and the project team.
- '**Case studies**': focuses on the four case study areas in which the project is implemented (Italy, Spain, Israel and Morocco). Each case study has a dedicated page with a description of the general context, issues to be addressed, solutions and technologies implemented in the case study area, expected impacts, an aerial image of the area, information about the Partner, beneficiaries and Stakeholders involved.
- '**Resources**': provides visitors with easy access to content and materials related to the project activities and it is divided into the following submenus:

Fig. 15. *NPP-SOL website – Resources Section*



- **Deliverables**
- **Publications**
- **Project Materials**
- **Newsletters**
- **Press room**
- **Communication kit**

- '**News & Events**': that includes relevant articles and news about past or future initiatives related to NPP-SOL Project.
- '**Contacts**': contact form to ask for information or keep in touch with the project management.
- "**Repository**": that is linked to the internal cloud of the project and is only accessible by consortium members upon registration. The section serves as a repository for the exchange of documentation, deliverables, reports, minutes etc.

For an easy access and consultation, the **homepage** also includes a section named "**at a glance**" with quick links to the main sub-areas of the website, as well as other relevant pages.



Fig. 16 NPP-SOL website – "AT A GLANCE" section

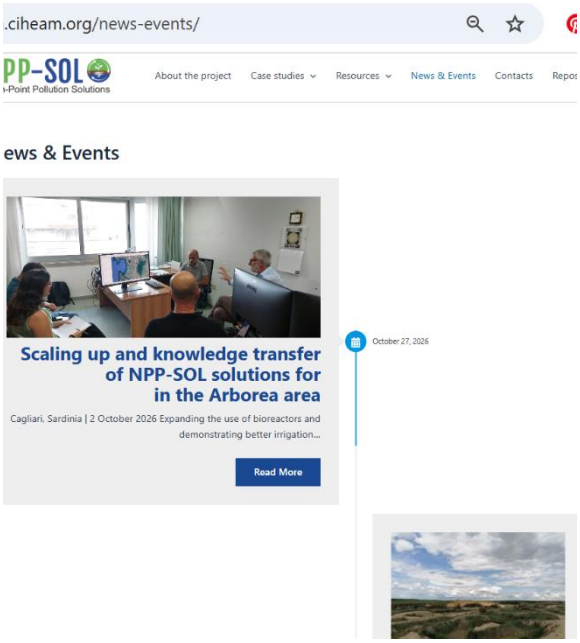


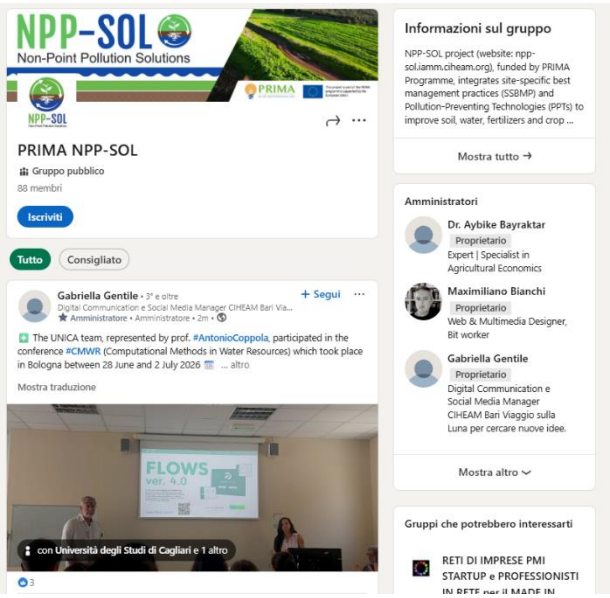
Fig. 17 NPP-SOL website – "News & Events" section

In addition to the static content, the **News & Events** section of the project website is regularly updated to ensure continuous visibility of project milestones, field activities, stakeholder engagement events, and relevant publications. This dynamic section serves as a central hub for disseminating timely updates and reinforces the project's commitment to knowledge sharing and stakeholders engagement across all partner countries.

Website analytics confirm a steady growth of the audience reached through this channel. Between **30 June 2024** and **27 October 2026**, the NPP-SOL website recorded **3,358 visits** and **7,630 pageviews** (6,037 unique pageviews), with an average time spent on the site of 2 minutes and 58 seconds and an average of 2.6 actions per visit. Over the same period, visitors **downloaded project materials 466 times** (396 unique downloads) and **followed 650 outlinks** (596 unique external links), which shows an active use of the resources made available through the Resources and Project Materials sections.

More information are included in the **ANNEX 4. NPP-SOL website analytics.**

2.5 Project Social Media Strategy



Within the first three years of project's implementation, part of the communication activities aimed at establishing an official presence of the project on social media platforms (Linkedin).

These activities have included the setting up and the updating of a **Linkedin public group** https://bit.ly/NPP_SOL.

Partners have been provided (D 5.1 NPP-SOL Outward Strategy) with guidelines and suggestions to develop project-related communication activities on their social media channels, ensuring alignment with the project's overall goals and communication objectives, and ensuring proper visibility of the project's activities, stakeholders, and PRIMA.

Fig. 18. NPP-SOL LinkedIn public group

Over the last year, the Linkedin group grew from 9 members to **84** (as of November 2025).

As of **October 2026**, the LinkedIn group counts **88** members. During the third year, Partners continued to relay the project's activities through their own institutional channels: in particular, the MAiMA research group of the University of Barcelona published dedicated posts on the participation in the CIAS 2026 congress (July 2026) and in the ICWS 2026 conference (September 2026).

Over the last year of activity (**28 October 2025 – 27 October 2026**), LinkedIn analytics recorded **2,305 members** who visited or interacted with the group, **7 posts published** and **5,883 post views**. Since LinkedIn group statistics only cover the previous twelve months, these figures are to be added to those of the previous monitoring exercise (1 November 2024 – 21 November 2025), which recorded **3,869 visiting members**, **17 posts** and **14,006 post views**. Over the two monitored periods, the group therefore totals **6,174 members** who visited or interacted with it and **19,889 post views**.

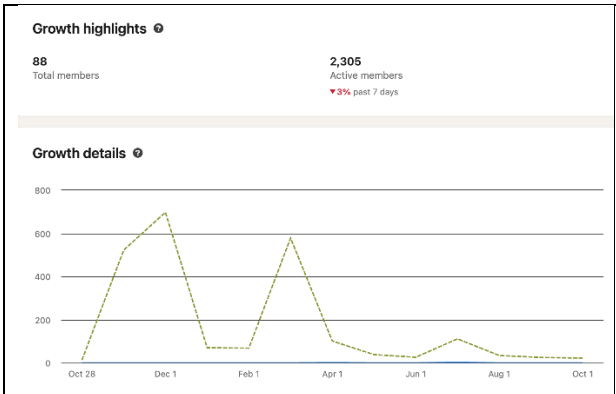


Fig. 19. NPP-SOL LinkedIn growth highlights

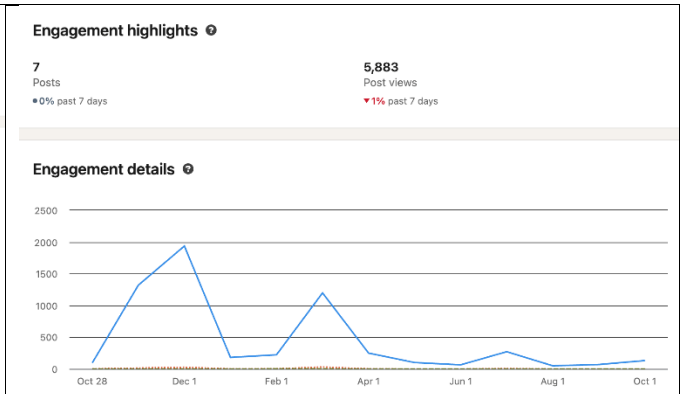
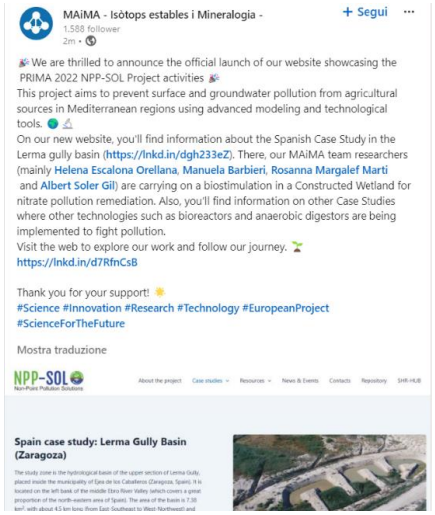
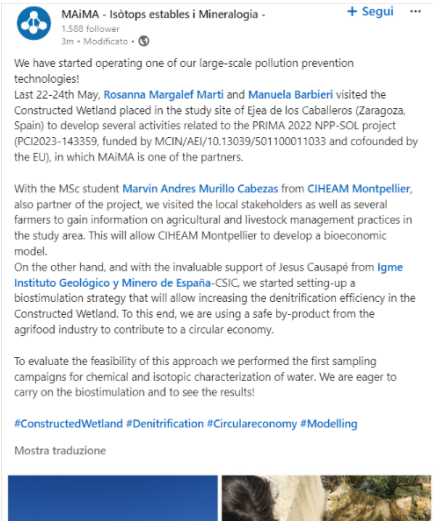


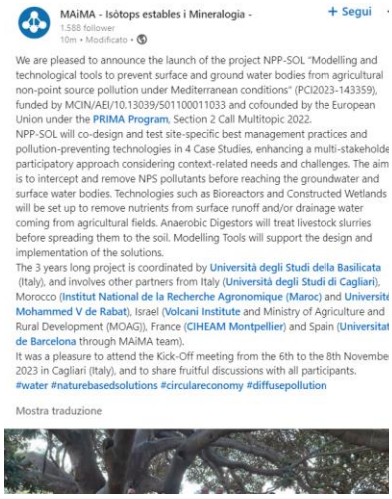
Fig. 20. NPP-SOL LinkedIn engagement highlights

Taking advantage of the implemented initiatives that have been scheduled for the end of 2024 (mainly trainings and knowledge transfer activities), specific visibility actions shall be implemented.

In addition, some Partners have shared several posts using their own institutional channels (Linkedin) providing news on activities related to the project. Here are some examples:



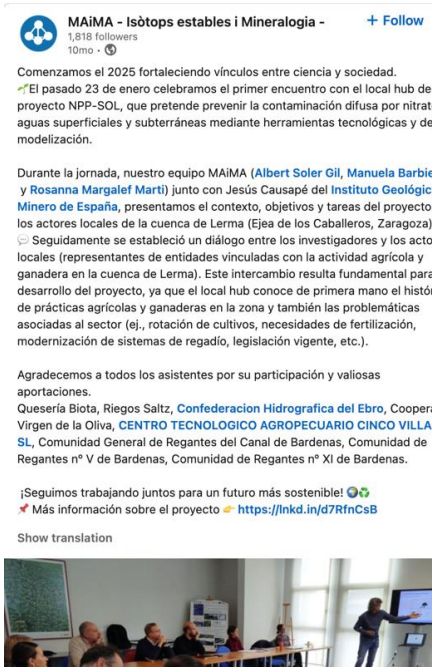




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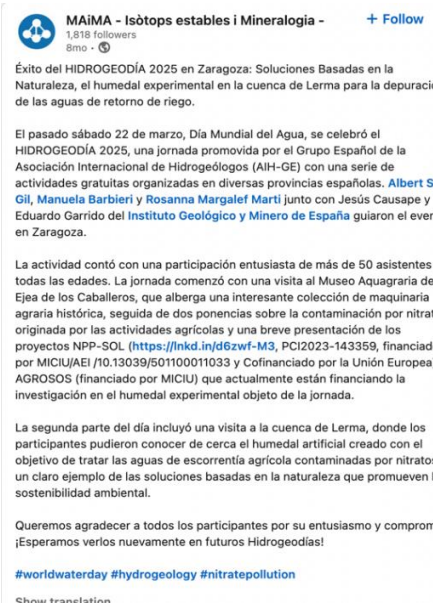
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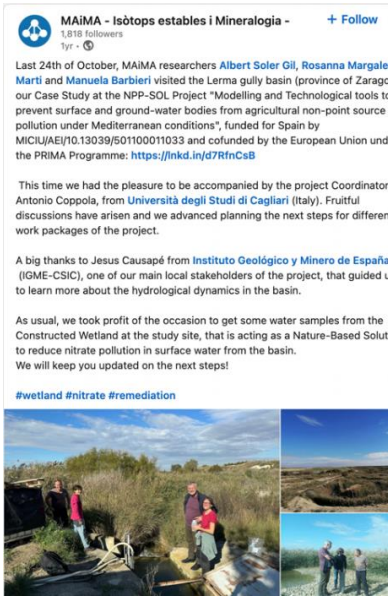
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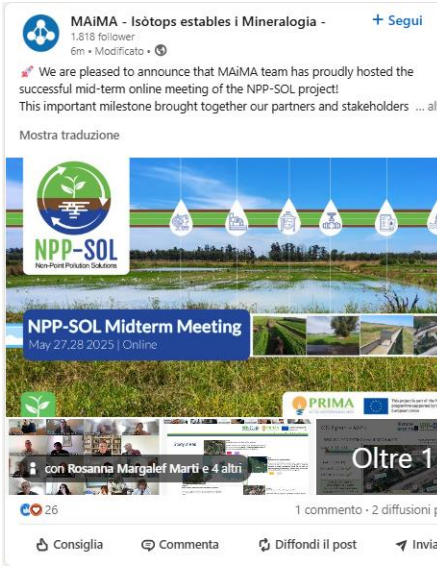
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Fig. 21. Examples of social media communication by Partners and Stakeholders

In 2026, the UB-MAiMA group published two LinkedIn posts on its institutional channel presenting NPP-SOL results: one on the contribution to the Congreso Ibérico de las Aguas Subterráneas (CIAS2026, July 2026, in Spanish; https://www.linkedin.com/posts/maima-ub_cias2026-hydrogeology-groundwater-activity-7481357341872021504-MrEs) and one on the 19th IWA International Conference on Wetland Systems for Water Pollution Control (18 September 2026, in English; https://www.linkedin.com/posts/maima-ub_icws2026-iwa-wetlandsystems-activity-7506647637660446720-UTdz).

2.6 - Factsheets and electronic newsletters

Starting from M6, the project has been publishing **NPP-SOL electronic newsletters** constructed and uploaded on the project website. Up to October 2026, **5 issues** were released. The contents have been provided, from time to time, by the coordinator or by the project partners and included:

- News regarding meetings, technical visits, info days, conferences, field visits or other events internal or external to NPP-SOL;
- Press releases;
- News about other PRIMA initiatives.

During the third year, the News section of the project website was further fed with contributions provided by the Partners, reporting among others on the technical exchange hosted by CIHEAM Montpellier (January 2026) and on the participation of the UNICA team in the CMWR 2026 Conference (July 2026).

The newsletters are structured in an easy-to-read format and have been embedded in the project website to further increase their views and traffic.



Fig 22. NPP-SOL electronic newsletter M6

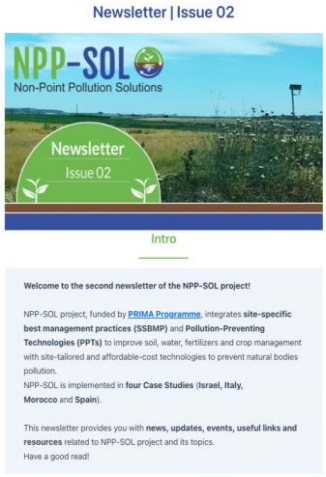


Fig. 23. NPP-SOL electronic newsletter M12

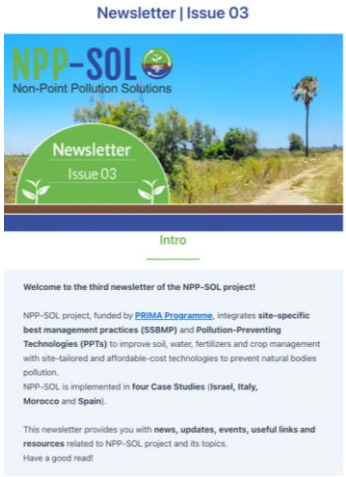


Fig. 24. NPP-SOL electronic newsletter M18

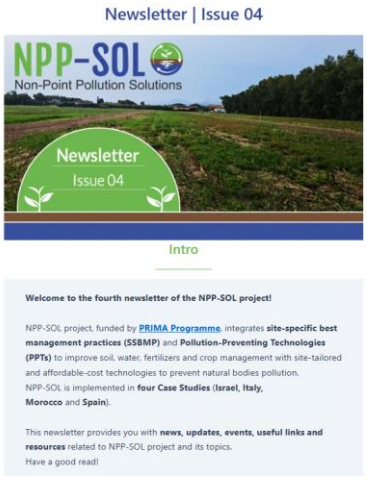


Fig. 25. NPP-SOL electronic newsletter M26



Fig. 26. NPP-SOL electronic newsletter M36

2.7 - Press releases and news published by external pages

In order to facilitate the spreading of information about the project, **two press kit templates** (in English and Italian) have been elaborated and are available on the project website, to support Partners in the relations with local press and the dissemination of the project activities and achievements to a wider public.

Within the first three years of implementation of NPP-SOL (M1/M26), **news** about the project activities (mainly studies and events) were relaunched by Partners and appeared online:

- http://www.ub.edu/maima/news-detail/164
- https://magazine.unica.it/eventi/progetto-prima-2/
- https://anr.fr/Project-ANR-23-P012-0001
- https://www.arborea1956.com/progetti/npp-sol-una-soluzione-gentile-per-mitigare-gli-impatti-ambientali/
- https://www.cnr.it/it/news/13590/joint-meeting-prima-projects
- https://w2rlab.net.technion.ac.il/2024/09/28/npp-sol-website/
- https://w2rlab.net.technion.ac.il/?p=2686

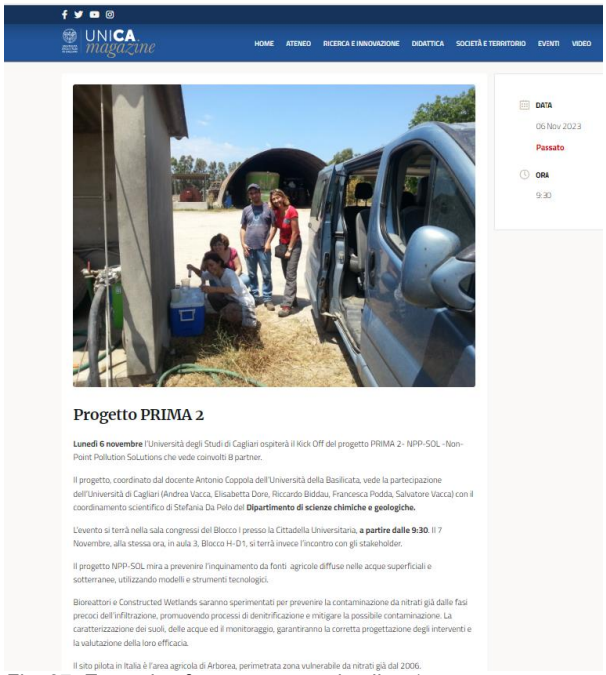


Fig. 27. Example of news appeared online 1



Fig. 28. Example of news appeared online 2



Fig. 29. Example of news appeared online 3



Fig. 30. Example of news appeared online 4

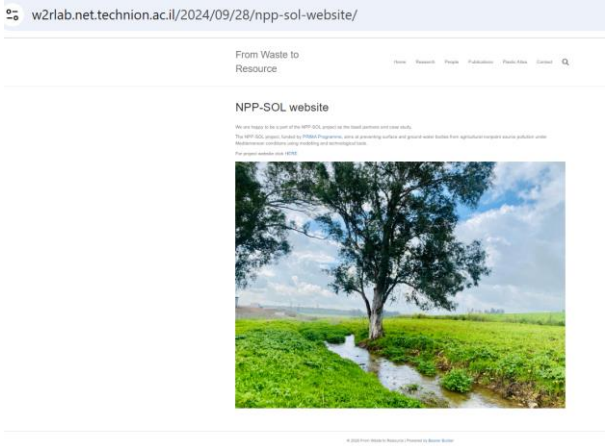
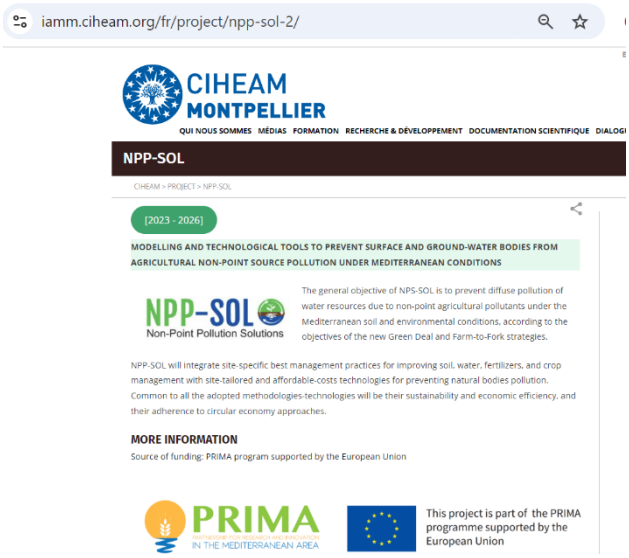


Fig. 31. Example of news appeared online 5



Furthermore, the Mediterranean Agronomic Institute of Montpellier (CIHEAM-IAMM) has included in its institutional website, a page specifically dedicated to NPP-SOL, providing general information about the project:

https://www.iamm.ciheam.org/fr/project/npp-sol-2/

2.8 - Project videos

In order to promote the project and communicate its activities and results, **5 videos** have been published on the **YouTube channel** of the project, which has collected **290 views** to date.

The videos, elaborated at the occasion of **field visits in the case studies of the project,** focus on showcasing the innovative solutions to address the main challenges related to water management in the areas. Their main purpose is to raise awareness and inform the audience about the water-related challenges, while demonstrating how technologies such as bioreactors can help improve water quality and availability. The videos aim to provide a comprehensive understanding, both technical and contextual, of water issues and the solutions implemented within the project.

The videos, also include interviews, highlights on the research activities, development of technologies and best practices.

LINK TO THE VIDEOS

https://www.youtube.com/watch?v=wzWTj4UH8I8 - NPP-SOL Insights | Video of the case study area in Morocco (11 November 2024)

https://www.youtube.com/watch?v=PcfIYEP6-rQ – NPP-SOL Insights | Water threats in Sardinia, Italy (17 November 2025)

https://www.youtube.com/watch?v=G91WyD-_lXw – NPP-SOL Insights | How a bioreactor works (17 November 2025)

https://www.youtube.com/watch?v=YjJRgJoaFHg – Fertilizers and pollution in Arborea Plain, Sardinia, Italy (11 December 2025)

https://www.youtube.com/watch?v=c8bxIMwgtAs - Interview with Mauro Panetto | Panetto Dairy Farm, Sardinia, Italy (27 February 2026)

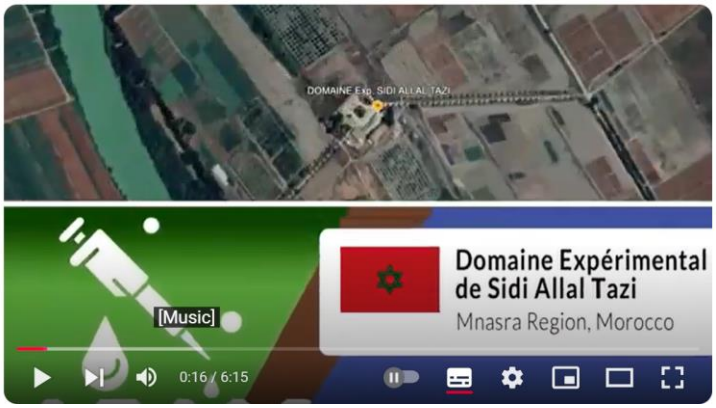


Fig. 32. Screen of the video of the field visit in Morocco (June 2024)



Fig. 33. Screen of the video 1



Fig. 34. Screen of the video 2



Fig. 35. Screen of the video 3

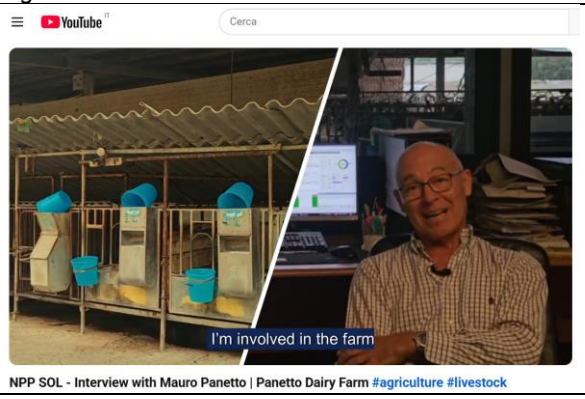


Fig. 36. Screen of the video 4

During the third year, a further video was released on 27 February 2026: an interview with Mauro Panetto of the Panetto dairy farm, giving voice to a local livestock producer of the Arborea Plain (Sardinia, Italy) on the relationship between livestock farming, agriculture and water quality in the case study area. Link: https://www.youtube.com/watch?v=c8bxIMwgtAs

2.9 - Communication Key Performance Indicators

The following **KPIs** will be used for the monitoring of each tool/channel/activity related to communication
and to evaluate the success of the dissemination and communication activities.

Tool	Item/Description	KPIs
Project Visual Identity Kit	project visual identity kit	1
	Project leaflet	1 Brochure elaborated for the Kick-off meeting. 1 Project leaflet in English and 4 in the other languages of consortium countries (Italian, Hebrew, French and Spanish) 1 Event Leaflet in English, French and Arabic for the Information Day in Morocco
	Poster	1 poster Project poster in English 1 poster Panel lerma in spanish 1 poster Field study marocco in english 1 poster on nitrate mitigation through natural wetlands in Moroccan rice systems, in French and English 1 poster on the FLOWS model, for the seminar addressed to ADIS – Sardinian District Water Authority, in English 3 scientific posters presented by UB-MAiMA at international conferences during the third year
	Banner	1 Banner to be used for communication on social media 1 Banner for the Information Day in Morocco
Project Public Website	NPP-SOL Website (period 30 June 2024 – 27 October 2026)	**3,358** visits to the Website **7,630** pageviews (6,037 unique) **466** downloads (396 unique) **650** outlinks (596 unique) Average time on site: **2 min 58 s** **76 countries of origin**

Social Media	Project Social Media group on Linkedin (https://bit.ly/NPP_SOL) and social media channels of the Partners	Nr. of members of the LinkedIn group:: **88 members** Nr. of members who visited or interacted with the group: **6,174** (over the two monitored periods) Nr. of posts on Linkedin group: **24** Nr. of post views: **19,889** Nr. of posts on Partner's SNs: **11**
Factsheets and electronic newsletters	Factsheets with infographics and electronic newsletters	5 Newsletters (since M6) 5 News published by external pages 4 Factsheets, for the case studies (For the moment, only published on the project website)
Press release	Press kit available for download	2 press releases (in English and Italian)
Project videos	NPP-SOL project videos	1 video of the field visit in Morocco 1 video interview: Water threats in Sardinia, Italy 1 video Interview: How a bioreactor works in Sardinia, Italy 1 Video interview: Water threats in Sardinia, Italy 1 Video interview: Interview with Mauro Panetto | Panetto Dairy Farm, Sardinia, Italy

3. Knowledge and Technology Transfer Activities (Dissemination)

3.1 - Open Access to scientific publications in international peer-reviewed journals

With the aim of facilitating the dissemination of knowledge and subjects related to the scientific activities, **NPP-SOL website** hosts a specific section dedicated to scientific publications, studies and other relevant resources in complementarity with the SHR platform established by CIHEAM IAMM.

Within the first three years, a total of **31 articles, studies** and **scientific publications** in international peer-reviewed journals, have been uploaded on the project website: https://npp-sol.iamm.ciheam.org/publications/ .

These publications guarantee the dissemination toward the international community of scientific knowledge and subjects related to NPP-SOL project.

Most of the publications were included on **WOS – web of science** or **SCOPUS** portals.

Between January and September 2026, Partners reported the following scientific publications (status as declared in the Partner Reporting Forms; publications that are not yet available online will be uploaded to the project website once published):

- **Published (peer-reviewed review article, open access)**: El Ouali O., El Abbari C., Labjar N., Zouahri A., Dakak H., Beniken L., Omari F.E., Nasrellah H., El Hajjaji S. (2026). Integrated Bioreactor and Wetland-Based Approaches for Agricultural Drainage Treatment: A Comprehensive Review of Design, Performance, and Field Applications. Environments, 13(3), 158. Open access: https://doi.org/10.3390/environments13030158
- **Accepted / in press (peer-reviewed article, DOI assigned)**: Coppola A., Basile A., Comegna A., Fenu C., Concas A., Pili F., Hassan S.B.M. (2026). FLOWS: a model to simulate water and solutes fluxes in agricultural and environmental systems: 1. Theory and applications with intercode benchmarking. Engineering with Computers. https://doi.org/10.1007/s00366-026-02428-9
- **Published (peer-reviewed article, open access)**: Coppola A., Basile A., Comegna A., Fenu C., Concas A., Pili F., Hassan S.B.M. (2026). FLOWS: a model to simulate water and solutes fluxes in agricultural and environmental systems: 2. Modules for specific applications in water and nutrient management. Engineering with Computers, 42, article number 194. Open access: https://doi.org/10.1007/s00366-026-02433-y
- **Submitted, under review (peer-reviewed article)**: Hassan S.B.M., Zuddas G.L., Trudu E., Comegna A., Da Pelo S., Lobina F., Sessini A.M., Coppola A. (2026). Coupled agrohydrological and kinematic-wave modelling for agricultural bioreactor design. Ecohydrology, special issue "Modelling and Technological Bioremediation Tools for Agricultural Non-Point Source Pollution".
- **Conference abstract** – Margalef-Martí R., Escalona-Orellana H., Barbieri M., Luque J., Causapé J., Otero N., Soler A. (2026). Estimulación de la desnitrificación para optimizar la eliminación de nitratos en escorrentía agrícola en un humedal construido: evaluación isotópica. In: CIAS 2026 – Libro de resúmenes, Congreso Ibérico de las Aguas Subterráneas, Barcelona, ISBN 978-84-128882-1-8.
- **Technical publication** – FLOWS – FLOw of Water and Solutes in agricultural and environmental systems: new model release and handbook, published in open access on Zenodo (https://doi.org/10.5281/zenodo.17076523) and available through the web platform https://flows.unica.it/welcome.
- **In progress (article)**: scenario-based bioeconomic framework to assess nitrogen–irrigation strategies in contrasting Mediterranean corn-based systems in Italy and Spain, coupling process-based biophysical simulations with a partial-budget economic model (CIHEAM-IAMM, Z. Khannafer).
-



Fig. 37. NPP-SOL scientific publications

3.2 - Participation in scientific conferences, workshops, or networking events (Cooperation and joint initiatives with other PRIMA or H2020 projects)

In order to maximise the impacts of the project, NPP-SOL has been presented by the Partners at the occasion of **scientific conferences**, **workshops**, **networking activities** (also organized by other PRIMA or H2020 projects).
The presentation of the project has been made by using the NPP-SOL **communication tools** (mainly *leaflets, powerpoint presentation and poster*) as a support.

The **initiatives** and **events** identified by project partners for the dissemination activity are the following:

- **Turkish Delegate visit** from the Turkish Ministry of Agriculture 18 March 2024, Venue: CIHEAM Montpellier, France.
- **DIONYSUS project** kick-off meeting 1-2 July 2024, Venue: CIHEAM Montpellier, France
- **Researcher meeting**, 6 August 2024, Venue: Ondokuz Mayıs University, Samsun, Türkiye
- **Joint Congress SGI-SIMP** - Geology for a sustainable management of our Planet, 3-5 September 2024. Venue: Bari, Italy
- **IAH 2024 World Groundwater Congress**, 8-13 September 2024. Venue: Davos, Switzerland.
- **CS SPAIN**: 24 October 2024. Field visit of the Project Coordinator Antonio Coppola to CS of Lerma, Spain.
- **EXCEL4MED Living Lab meeting** / Co-Creation Workshop, 21 November 2024. Venue: Corinthia St George's Bay Hotel, Malta.
- **Tzipori River Restoration Project Stakeholder Event 2025** – held in Israel on 23 april 2025,

- **Hidrogeodía 2025** – held in Ejea de los Caballeros (Zaragoza), Spain on 22 March 2025. Open Demonstration Day at Lerma Case Study site: "*Nature-Based Solutions and the Experimental Wetland in the Lerma Basin*", organized by UB-MAiMA in collaboration with IGME-CSIC and International Association of Hydrogeologists (AIH-Spain).
- UNIBAS e UNICA participate in the event "in-situ meeting and training workshop on the bioreactors in Arborea case study" (May 2025)
- The Italian NPP-SOL Team Engages in Mediterranean Dialogue on Land and Water Sustainability within the framework of the Sixth General Assembly of the SALAM-MED project.University of Sassari May, 21, 2025.
- VIII Jornada de Jovenes Investigadores organized by Idra-UB (Spain), 25 April 2025. The UB-MAiMA presented "Assessing biostimulation efficiency to enhance denitrification in a constructed wetland using isotopic tools".
- The 7th FLOWPATH – National Meeting on Hydrogeology, Torino, Italia, 11–13 giugno 2025. The UNICA Team presented " Comparative assessment of groundwater recharge rates and transit time through the unsaturated zone for groundwater protection".
- 3rd IAGC International Conference Water Rock Interaction-18 & Applied Isotope Geochemistry-15, Cagliari, Italy. June 2025.The UB-MAiMA presented "Evaluating biostimulation efficiency in a constructed wetland to treat nitrate pollution with isotopic tools" and the UNICA Team presented "Fate of nitrate in the unsaturated zone: Evidence from the Arborea Plain (Sardinia, Italy)"
- Geomare Congress - Facultat de Ciències de la Terra, UB (Spain), 12 of November 2025. UB-MAiMA presented "Assessing biostimulation efficiency to enhance denitrification in a constructed wetland using isotopic tool"
- Representing CIHEAM Montpellier, postdoctoral researcher Aybike Bayraktar visited the Arborea case study site from 22 to 25 September to examine bioreactor technologies, engage with local stakeholders, and assess their potential for adoption within the NPP-SOL project.
- Italian Local Hub Meeting: First Results on Arborea Plain Aquifer Bioreactors – 5 November 2025
- An information day entitled *"Role of Good Agricultural and Water Management Practices for Resilient Rice Cultivation in Gharb–Morocco"* was held on 13 November 2025 at the Sidi Allal Tazi, INRA, Experimental Station.
- On 24 November 2025, a delegation consisting of representatives from various units of the Turkish Ministry of Agriculture and Forestry visited CIHEAM Montpellier.



Fig. 38. Dissemination of NPP-SOL Project at Tzipori River Restoration Project Stakeholder Event in Israel

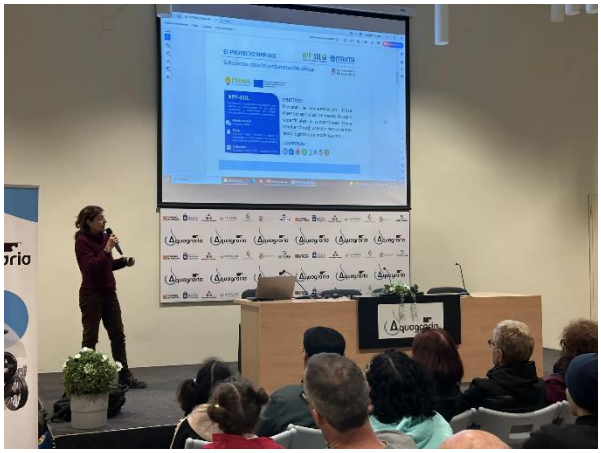


Fig. 39. Dissemination of NPP-SOL Project during Hidrogeodía 2025 event held in Zaragoza, Spain



Fig. 40. Dissemination of NPP-SOL Project during Agriculture Best Management Practices Workshop, June 2026, Israel



Fig. 41. Dissemination of NPP-SOL Project during IAH 2026 World Groundwater Congress, 14–18 September 2026, Budapest, Hungary

Between January and September 2026, the following initiatives were reported by Partners (in chronological order):

- **EXCEL4MED annual meeting** (Horizon Europe project), 26 January 2026, Venue: Malta; organised by the University of Athens, Greece. CIHEAM-IAMM (A. Bayraktar) presented the results and activities of NPP-SOL to the EXCEL4MED consortium partners and explored synergies between the two projects.
- **12th International Hasankeyf Scientific Research and Innovation Congress**, 30–31 January 2026, Batman, Türkiye (online), organised by ISARC. UM5R presented “Efficient Nitrogen Management for Sustainable and Resilient Agricultural Production”.
- **4th International Iyonya Scientific Research Congress**, 26–27 March 2026, İzmir, Türkiye (online), organised by Congress Group. UM5R presented “Innovative Strategies for Nitrogen Management in Sustainable Agriculture”.
- **9th International Food, Agriculture and Veterinary Sciences Congress**, 3–5 April 2026, Konya, Türkiye (online), organised by Konya Food and Agriculture University, IKSAD Institute and Iakob Gogebashvili Telavi State University. UM5R presented “Sustainable Soil Fertility Management for Environmental Protection”.
- **10th International Mediterranean Scientific Research and Innovation Congress**, 11–12 April 2026, Antalya, Türkiye (online), organised by Congress Group. UM5R presented “Efficient Nitrogen Management for Sustainable and Resilient Agricultural Production”.
- **1st International Ordu Scientific Research Congress**, 13–14 April 2026, Ordu, Türkiye (online), organised by Ordu University. UM5R presented “Strategies for Sustainable Soil and Water Protection from Nitrate Pollution”.
- **2nd International Marcus Aurelius Scientific Research Congress**, 18–19 April 2026, Ankara, Türkiye (online), organised by Congress Group and ISARC. UM5R (O. El Ouali) gave an oral presentation on “Integrated Nitrogen Management for Environmental and Agricultural Sustainability”.
- **European Geosciences Union General Assembly (EGU GA 2026)**, 3–8 May 2026, Venue: Vienna, Austria (in person). UNIBAS (S.B.M. Hassan) gave an oral presentation on “A New Fast in-Situ Soil Hydraulic Characterization Method Combining 2D Soil Water Flow Modelling and Time-Domain Reflectometry”, a low-cost method for the rapid field characterisation of soil hydraulic properties. The Assembly counted 22,497 registered participants (source: EGU). Abstract: https://meetingorganizer.copernicus.org/EGU26/EGU26-6956.html
- **International Yildirim Bayezid Scientific Research and Innovation Symposium II**, 8–9 May 2026, Bursa, Türkiye (online). UM5R presented “Optimizing Fertilizer Use to Reduce Environmental Risks in Agriculture”.

- **Scientific Conference for the Creation of Sustainable Social Scenarios**, 19 May 2026, Venue: Universitat de Barcelona, Spain (in person). UB (H. Escalona-Orellana) presented the poster "Sustainable nitrate remediation techniques within a circular economy framework", showing the evolution of nitrate concentration and isotopic composition during the biostimulation experiments at the Lerma constructed wetland (WP3, Task 3.3).
- **Riverine – Agriculture Best Management Practices Workshop**, June 2026, Israel (in person, invitation-only), organised by the Israel Ministry of Agriculture and Food Security and AGMA – Israel Center for Watersheds and Rivers, with the contribution of the Soil Erosion Research Station (SERS) and the Technion (Prof. R. Posmanik). The workshop was targeted at farmers and gathered 60 registered participants (21 women) including policy makers, researchers, extension services, NGOs, and drainage and river-basin authorities. Round-table discussions addressed measures to mitigate agricultural non-point source pollution, such as on-farm constructed wetlands, biogas, bioreactors, vegetative buffer zones and soil conservation practices.
- **Conference on Computational Methods in Water Resources (CMWR 2026)**, 28 June–2 July 2026, Venue: Bologna, Italy (in person). Prof. A. Coppola (UNIBAS/UNICA) gave an oral presentation on "Coupled Transformation and Transport of Organic Carbon and Nutrients in Soils: A Process-Based Representation within the FLOWS Model", including an application to the Arborea case study. About 400 participants, mainly from universities and research centres (estimate by the Partner).
- **International Farming Systems Association (IFSA) 2026 Conference**, 29 June–3 July 2026, Venue: Montpellier, France. Organised by CIHEAM-IAMM (Z. Khannafer as co-organiser; H. Belhouchette as Chair of the IFSA Steering Committee) and addressed to researchers, young researchers and academic institutions (https://ifsa2026.sciencesconf.org/).
- **Congreso Ibérico de las Aguas Subterráneas (CIAS2026)**, 1–3 July 2026, Venue: Barcelona, Spain (in person). Co-organised by AIH-GE, IDAEA-CSIC and UB. The UB-MAiMA team gave an oral presentation entitled "*Estimulación de la desnitrificación para optimizar la eliminación de nitratos en escorrentía agrícola en un humedal construido: evaluación isotópica*", reporting chemical and isotopic results from the Lerma constructed wetland. On this occasion, Rosanna Margalef-Martí received the AIH-GE Young Researchers Award for the best oral presentation. Book of abstracts: https://cias2026.webs.upv.es/
- **19th IWA International Conference on Wetland Systems for Water Pollution Control (ICWS 2026)**, 13–17 September 2026, Venue: Chania, Greece (in person), organised by the Technical University of Crete. UB gave an oral presentation ("Denitrification Stimulation Improves Agricultural Runoff Water Treatment in a Constructed Wetland as Revealed by Isotopic Analysis: comparison between two electron-donors") and presented a poster ("Isotopic assessment of nitrate removal in constructed wetlands: comparison between continuous and intermittent flow operation under whey-mediated biostimulation").
- **IAH 2026 World Groundwater Congress**, 14–18 September 2026, Venue: Budapest, Hungary (in person), 53rd Congress of the International Association of Hydrogeologists. UNICA (F. Lobina) gave an oral presentation in session 1.8 "Environmental tracers to investigate the anthropogenic impacts on groundwater": "Nitrogen dynamics and natural attenuation in the unsaturated zone: insights from a high-resolution study in the Arborea NVZ (Italy)", presenting preliminary results of the Italian case study. https://iah2026budapest.com/program/

3.3 - Capacity building and Training activities

Technical Capacity Building (TCB) and Farmers Awareness (FA) represents one of the main pillars of NPP-SOL project. By building a self-sustaining capacity inside Water Users Association, Environmental Agencies and Water Resources Managers, TCB and FA are indeed essential to guarantee the operability of the modelling and technological tools in the long run, ensure the adoption of technologies and practices beyond the project duration as well as to and promote the communication (transfer) of scientific knowledge and dissemination of outcomes from all the project activities to increase stakeholder adoption of these interventions. to advancing and enhancing the capabilities of Stakeholder to adapt and manage the pollution preventing technologies and the site-specific best management practices developed in the project.

TCB and FA activities also facilitate (i) the application of site-specific best practices generated by the project, (ii) the monitoring of the effectiveness of the applied technologies and their refinement over time and (iii) the dissemination of the tested technologies and optimized throughout the area affected by NPS pollution.

In order to implement effective TBC and AF activities, it has been elaborated a **comprehensive training program** in which, for each case study, topic, objective, main target, provisional calendar and location of the different activities are defined.

Training Program – Overview

1. Agrohydrological & Bioeconomic Modelling

Advanced modeling using FLOWS and DAHBSIM tools to support site-specific best management practices for reducing agricultural pollution

- **Scheduled:** Oct 2024, Oct 2025, Jun 2026 (3 sessions planned)
- **Partners Required:** Italy, Israel**,** Spain, Morocco

2. Technology Design

Technical methodologies and engineering planning for design of bioreactors, constructed wetlands, and anaerobic digesters

- **Scheduled:** Feb 2025 – Feb 2026
- **Partners Required:** Italy, Israel | **Not required:** Spain, Morocco

3. Technology Construction

Hands-on, field-based building and installation of pollution-preventing technologies with practical experience

- **Scheduled:** Dec 2024
- **Partners Required:** Italy, Israel, Morocco | **Not required:** Spain

4. Technology Monitoring

Continuous site-specific assessment, data collection, equipment training, and optimization of installed technologies

- **Scheduled:** Feb 2025- Feb 2026 (ongoing)
- **Partners Required:** Italy, Israel, Spain, Morocco

5. Open Demonstration Day

Live field demonstrations of pollution-preventing technologies and practices for stakeholders, farmers, and public engagement

- **Scheduled:** Nov 2024 (each case study specifies based on site readiness)
- **Partners Required:** Italy, Israel, Spain, Morocco

6. Bioeconomic Modelling Technical Talk

Online technical session demonstrating integrated bioeconomic and agrohydrological simulation models with practical applications

- **Scheduled:** Sep 15, 2025 (+ there's a planned follow-up session)
- **Trainer/Coordinator:** CIHEAM-IAMM
- **Partners Required:** Italy, Spain, Morocco | **Not required:** Israel

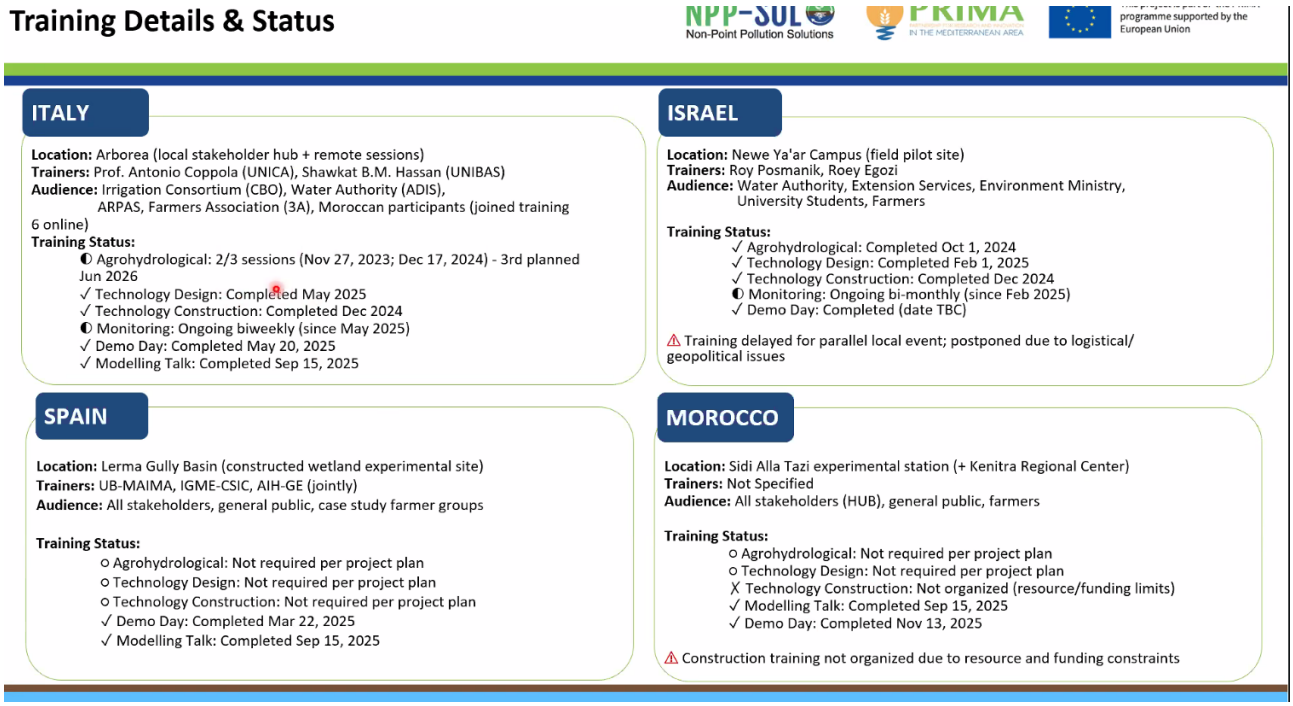


Fig. 42. Training Program NPP-SOL Project – details and status

Furthermore, partners have agreed on a common content plan for training (see Annex 3). Despite the differences that exist between the different case studies, this common plan can constitute the starting point for scaling out and for effective cross-fertilization phase.

TCB and FA includes the following:

TCB activities on Modelling: Technicians from WUA, EA and WRM will be trained to run the modelling tool independently, with the aim of real-time adjustments and optimizations of the NPS pollution-preventing technologies developed in the project with changing scenarios in terms of climate, crop, and irrigation management. Trainings on Modelling will be held simultaneously for SEs of all the Case Studies, through webinars and face-to-face during the project conferences.

TCB activities on Maintenance and technical regulation: The NPP-SOL Pollution-Preventing technologies need to be maintained and regulated beyond the project lifetime. Training with demonstration will assure the sustainability of the action.

Involvement and assistance to farmers (FA activities)*:* Best practices will be analysed, transferred and shared, adopting farmer-friendly and context-related approaches. Information and training will be provided on meaning, background, benefits, and operational skills of the technologies and site-specific, modelling-based, water and nutrients good management practices to farmers to induce a deeper awareness of the environmental issue related to their farming behaviour. 3 half-day demonstration events will be organized for each CS. During the trainings by doing (see the item above), the local SEs will establish modes and procedure to involve farmers (M15).

Trainings to SE technicians: Technicians from WUA, EA and WRM will be trained on MT use, maintenance and technical regulation of PPT developed in the project. Technicians will be the main link among NPP-SOL findings and farmers, by transferring information about background, benefits, and operational skills of the PPT and SSBMP for water and nutrients. Trainings will be held by webinars (at least 2), face-to-face meetings, on-site training-by-doing. A detailed plan of trainings will be provided at M6. At all the training event, people involved will be regularly provided with all the documentation and materials needed for trainings. Tech guidelines and handbooks will be co-edited with the NPP-SOL SE community to address soil, water, fertilizers and crop management.

The following **training** and **capacity building activities** have been held during the M1/M26 of the project:

- ❑ **4 Trainings** addressed to farmers and officials at the Oristano reclamation and irrigation consortium to explain and introduce the bioreactors as the pollution-prevention technology. **Title**: "*Reducing groundwater nitrate pollution in Arborea plain originating from agro-zootechnical activities using in-situ biological treatment technologies*". **When:** 13 to 16 May 2024. **Where**: Oristano, Italy. **LINK** to the training material.

Training 1: Agrohydrological and Bioeconomic Modelling (Identifying Site-Specific Best Management Practices)

In Italy, the Agrohydrological and Bioeconomic Modelling training was completed through two sessions held on 27 November 2023 and 17 December 2024. The audience included representatives from the Irrigation Consortium (CBO), Water Authority (ADIS), ARPAS, Farmers Association (3A), as well as participants from the Moroccan National Institute of Agricultural Research (INRA) and Moroccan university students.

In Israel, the Agrohydrological and Bioeconomic Modelling training was completed on 1 October 2024. The audience included representatives from Water Authority, Extension Services, the Ministry of Environment.

Training 2: Technology Design

In Italy, the training was partially completed in May 2025. The participants were the representatives from the Irrigation Consortium (CBO), Water Authority (ADIS), ARPAS, and the Farmers Association (3A).

In Israel, the training was partially completed in February 2025. Representatives from the Water Authority, Agricultural Extension services, and farmers also participated in the training.

Training 3: Technology Construction

In Italy, the training was successfully completed through in-person, on-site sessions in December 2024.

In Israel, the training was successfully completed in December 2024.

Training 4: Technology Monitoring

In Italy, the training is being implemented through regular monitoring activities which started in 2025 and are currently ongoing.

In Israel, the training is being carried out through regular monitoring activities, which have been ongoing since 2025.

Training 5: Open Demonstration Day

In Italy, the open demonstration day was successfully conducted on 20 May 2025. The event was open to all project stakeholders as well as the general public.

In Spain, the open demonstration day was successfully completed on 22 March 2025. The event was jointly organized by UB-MaiMa, IGME-CSIC and AIH-GE, involved all stakeholders, members of the general public and farmer groups.

In Israel, the open demonstration day was successfully completed in 2025. The event included government representatives, farmers, extension services and students.

In Morocco, the open demonstration day was successfully completed on 20 November 2025. The event engaged all stakeholders, members of the general public and farmers.

Training 6: Agrohydrological and Bioeconomic Modelling Technical-Informative Talk

The training was successfully conducted as a joint online event on 15 September 2025. The session was delivered by CIHEAM-IAMM and brought participants from Italy, Spain and Morocco, including representatives from local, national and regional stakeholders.

Other training and knowledge-transfer activities reported in 2026

Agrohydrological and Bioeconomic Modelling – follow-up session (2026)

A dedicated technical working session was held at CIHEAM Montpellier from 27 to 29 January 2026, bringing together the Project Coordinator Antonio Coppola with Shawkat B.M. Hassan and Andrea Vacca (Italian team) and Hatem Belhouchette, Aybike Bayraktar and Zaynab Khannafer (CIHEAM Montpellier). The session focused on WP4 and on the integrated use of the DAHBSIM bioeconomic model and the FLOWS-HAGES agro-hydrological framework, with the aim of transferring the

modelling tools and of parameterising the enhanced model to assess the socio-economic and environmental impacts of the jointly designed SSBMP and PTT-based scenarios.

Knowledge transfer: short research stay at CEBAS-CSIC (Spain)

From 3 to 15 February 2026, a doctoral researcher of Mohammed V University in Rabat carried out a short research stay at the Centro de Edafología y Biología Aplicada del Segura (CEBAS-CSIC), Murcia, Spain, within the Plant Nutrition Department. The stay strengthened scientific and technical capacity on agricultural drainage-water quality, nitrate pollution and nature-based solutions, and addressed the application of Life Cycle Assessment (LCA) to evaluate the environmental sustainability of alternative drainage-water treatment systems.

Farmers and stakeholders awareness: Riverine–Agriculture Best Management Practices Workshop (Israel)

In June 2026, the Israeli Partners took part in the Riverine–Agriculture Best Management Practices Workshop, co-organised by the Ministry of Agriculture and Food Security and AGMA – Israel Center for Watersheds and Rivers. The invite-only event was deliberately designed around farmers and gathered 60 registered participants (21 women), representing farmers from different agricultural regions, policy decision makers, researchers and extension services, R&D institutions, NGOs, and drainage, streams and river basin authorities. Round tables addressed concrete case studies on the mitigation of agricultural runoff, agrochemicals, excess nutrients and sediment discharge, covering on-farm treatment facilities (constructed wetlands, biogas plants and bioreactors), vegetative buffer zones, river channel widening, removal of hydraulic barriers, runoff retention traps, drainage road culverts and soil conservation practices. Feedback from participants confirmed the added value of focusing on farmers and of presenting feasible combinations of existing technologies at farm scale.

3.4 - Dissemination Key Performance Indicators

The following **KPIs** will be used for the monitoring and evaluation of the outreach activities.

Tool	Item/Description	KPIs
Open Access scientific publications	Scientific articles published in international peer-reviewed journals and made available through the project website	31 publications uploaded on the project website, of which 6 scientific outputs produced during the third year: 1 peer-reviewed article published in open access in Engineering with Computers (DOI) 1 peer-reviewed article published in open access in

		Engineering with Computers (DOI) **1 peer1-reviewed article** in press in Engineering with Computers (DOI assigned) **1 peer-reviewed article** submitted – under review **1 conference abstract** published in a book of abstracts (ISBN) **1 technical publication** (model handbook, open access on Zenodo)
Presentations at scientific conferences and workshops, exchanges with other projects	Presentation of project methodologies, research findings and preliminary results at national and international scientific events	**16 scientific contributions presented (oral presentations and posters)** (Uploaded on NPP-SOL website); Of wich: **2** Abstracts
Stakeholder engagement events and Local Hubs	Participatory events addressed to local stakeholders in the four case study areas	**4 Local Hubs established** and operational (Italy, Spain, Israel, Morocco), plus Partner-level hubs. **1 Information Day** on good agricultural and water management practices (Gharb, Morocco, 13 November 2025) **1 Riverine–Agriculture Best Management Practices Workshop** (Israel, June 2026) – 60 registered participants, of whom 21 women, representing farmers, river basin and drainage authorities, policy makers, extension services, research institutions and NGOs
Training activities	Trainings for farmers to explain and introduce the bioreactors as the pollution-prevention technology.	**4 Trainings for farmers**; **10** participants to each training **6 training modules** of the NPP-SOL Training Programme, completed or ongoing across the four case studies; **1 technical working session on the FLOWS and DAHBSIM**

		modelling tools (Montpellier, January 2026) – 6 researchers from 3 Partners 1 short research stay for knowledge transfer (CEBAS-CSIC, Murcia, February 2026) – 1 researcher, 2 institutions

4. ANNEXES

ANNEX 1 - NPP-SOL LEAFLETS

PARTNERSHIP

Eight partners from five Mediterranean countries are participating in the project:

- University of Basilicata (UNIBAS) - **Italy** (Coordinator)
- University of Cagliari (UNICA) - **Italy**
- University of Barcelona (UB) - **Spain**
- Mediterranean Agronomic Institute of Montpellier (CIHEAM-IAMM)- **France**
- Agricultural Research Organization – Volcani Institute (ARO) - **Israel**
- Ministry of Agriculture and Rural Development (MOAG) - **Israel**
- National Institute of Agricultural Research (INRA) - **Morocco**
- Mohammed V University of Rabat (UM5) - **Morocco**



npp.sol.projectmanagement@gmail.com
https://npp-sol.iamm.ciheam.org/

NPP-SOL Non-Point Pollution Solutions

PRIMA This project is part of the PRIMA programme supported by the European Union



NPP-SOL

Modelling and Technological Tools to Prevent Surface and Ground-Water Bodies from Agricultural Non-Point Source Pollution Under Mediterranean Conditions

FUNDING
PRIMA programme

TOPIC
Topic 2.1.1-2022 (RIA) Prevent and reduce land and water salinization and pollution due to agri-food activities

DURATION
36 months

BUDGET
2.171.257 €

GENERAL OBJECTIVE

The project, NPP-SOL, funded by PRIMA aims at preventing surface and ground-water bodies from agricultural non-point source pollution under Mediterranean conditions using modelling and technological tools.

NPP-SOL Non-Point Pollution Solutions

APPROACH

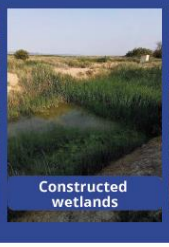
NPP-SOL integrates site-specific **best management practices** to improve soil, water, fertilizers, and crop management with site-tailored and affordable-cost **technologies** to prevent water bodies pollution.
Common to all the adopted methodologies-technologies is their sustainability, economic effciency, and adherence to circular economy approach.

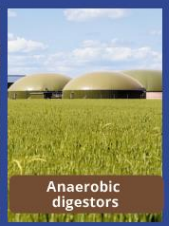
TECHNOLOGIES

In order to intercept and remove NPS pollutants before reaching the groundwater and surface water bodies, the following technologies will be implemented:

- **bioreactors** and **constructed wetlands** to remove nutrients and pesticides from surface runoff and/or drainage water coming from agricultural fields;
- **anaerobic digestors** to treat livestock slurries before spreading them to the soil.


Bioreactors


Constructed wetlands


Anaerobic digestors

CASE STUDIES

NPP-SOL is implemented in four **Case Studies** (Israel, Italy, Morocco and Spain).

ISRAEL
Newe Ya'ar experimental farm (Jezre'el Valley)
Agricultural practices in the area involve over fertilization and poor management of liquid effluents from CAFO. High NPS pollution sources threaten the sustainability of agriculture since they impact on the quality of Nahalal River.

ITALY
Arborea Plain (Sardinia Region)
Since 2006, a specific action programme for the reduction of NO3 in water bodies has been developed. Despite a significant reduction in nitrate concentrations during the first years of application, these concentrations are still high, above the threshold values established by national and European legislation.

MOROCCO
Mnasra (Gharb Region)
The misuse of irrigation water and agrochemical inputs have brought to a widespread pollution of ground and surface water by NO3 and salinity.

SPAIN
Lerma basin (Arba river catchment)
In agricultural land irrigated since the 2000s, a progressive increase in the use of fertilisers (NPK) has led to a three-fold increase of N input to the Arba river, recognized as affected by NO3 pollution.





ANNEX 2 - NPP-SOL BANNERS




Role of good agricultural and water management practices for resilient rice cultivation in Gharb - Morocco
Information day
November 13, 2025
Sidi Allal Tazi Experimental Station
Regional Center for Agricultural Research of Kenitra
PROMEDRICE
UM6P
University Mohammed VI Polytechnic
NPP-SOL
Non-Point Pollution Solutions
PRIMA

ANNEX 3 - NPP-SOL TRAINING MATERIAL

ANNEX 3.1. Examples of Attendance Sheets

NPP-SOL Non-Point Pollution Solutions
PRIMA PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA
This project is part of the PRIMA programme supported by the European Union

NPP-SOL

Modelling and technological tools to prevent surface and ground-water bodies from agricultural non-point source pollution under Mediterranean conditions

Training Session: Using Bioeconomic Modelling for Strategic Decisions in Agriculture - 15.09.2025

Organiser of the event: CIHEAM Montpellier

Attendance sheet (all participants)

No.	First name	Last name	Organisation	Signature
1	Aybike	Bayraktar	CIHEAM Montpellier	Online
2	Hatem	Belhouchette	CIHEAM Montpellier	Online
3	Zaynab	Khannafer	CIHEAM Montpellier	Online
4	Antonio	Coppola	University of Cagliari	Online
5	Shawkat	Hassan	University of Basilicata	Online
6	Antonio	Sessini	University of Cagliari	Online
7	Alessandra	Scardigno	CIHEAM Bari	Online
8	Anissa	Nouiyer	CIHEAM Bari	Online
9	Chiara	Ciannamea	CIHEAM Bari	Online
10	Francesca	Lobina	University of Cagliari	Online
11	Faiza	Souid	University of Cagliari	Online

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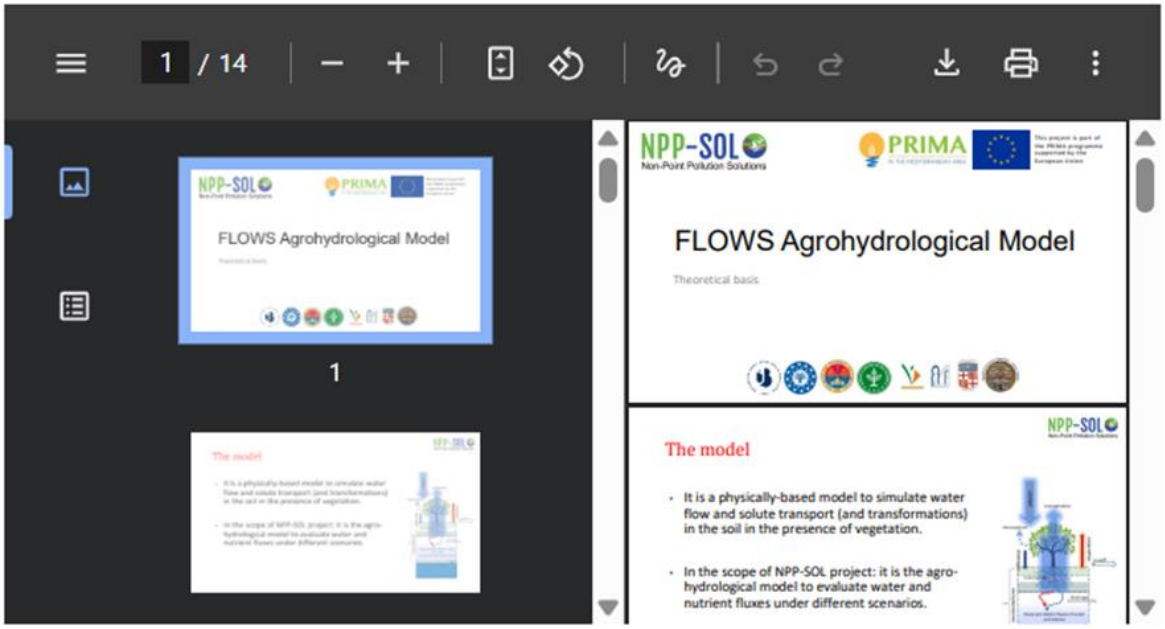
NPP-SOL Non-Point Pollution Solutions
PRIMA PARTNERSHIP FOR RESEARCH AND INNOVATION IN THE MEDITERRANEAN AREA
This project is part of the PRIMA programme supported by the European Union

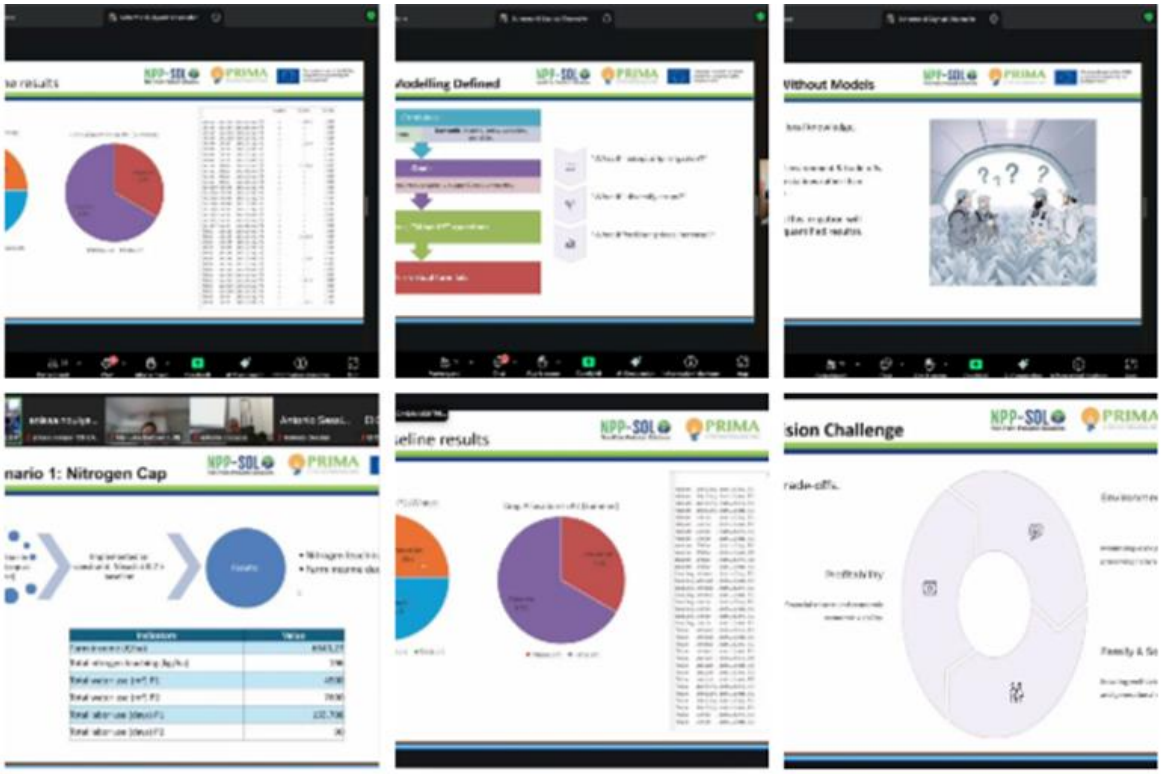
12	Gian Luca	Zuddas	Oristano Irrigation Consortium	Online
13	Mario	Lorrai	ADIS Water Authority	Online
14	Sebastiano	Curreli	Latte Arborea Cooperative	Online
15	Pasquale	Lasio	ADIS Water Authority	Online
16	Manuela	Barbieri	University of Barcelona	Online
17	Helena	Escalona Orellana	University of Barcelona	Online
18	Jose	Luque Marin	University of Barcelona	Online
19	Rosanna	Margelef Marti	University of Barcelona	Online

ANNEX 3.2. Examples of the Certificates



ANNEX 3.3. Examples of the Presentations


1 / 14
FLOWS Agrohydrological Model
1
FLOWS Agrohydrological Model
Theoretical basis
The model
It is a physically-based model to simulate water flow and solute transport (and transformations) in the soil in the presence of vegetation.
In the scope of NPP-SOL project: it is the agro-hydrological model to evaluate water and nutrient fluxes under different scenarios.
FLOWS Overview rev 19-12-24
Download


Modelling Defined
Without Models
nario 1: Nitrogen Cap
sion Challenge

ANNEX 3.4. Examples of the Informative Documents

THE RICE SECTOR IN MOROCCO

The rice sector occupies an important place in the Moroccan agricultural landscape, both socio-economically and environmentally. It contributes to national food security, job creation in rural areas and the diversification of agricultural production. Thanks to the initiatives carried out under the Green Morocco Plan, the sector has experienced sustained growth, providing a stable income to nearly 2500 farmers and generating around 1.5 million working days per year, 87% of which are upstream and 13% downstream in the value chain.



On the technical level, national production covers about 72% of the country's needs. The Gharb region is the main rice-growing basin, accounting for nearly 75% of national production, with average yields reaching 8 t/ha in Gharb and 6.8 t/ha in Larache, which can exceed 11 t/ha on some high-performance farms. In 2022, national production amounted to 46800 tons on 5988 hectares cultivated.

However, the sector still faces several challenges: the high cost of inputs, the low varietal diversity (nearly 90% round rice), and a total dependence on imported seeds. In addition, there is limited national consumption (about 2.2 kg per capita per year), which is hampering the overall profitability of the sector.



Role of good agricultural and water management practices for resilient rice cultivation in Gharb-Morocco

Information Day

November 13, 2025

Sidi Allal Tazi Experimental Station,
Regional Center for Agricultural Research of Kenitra

As part of the "Generation Green" strategy, the national rice programme aims to:
- **Preserve the environment** by promoting innovative farming practices and sustainable use of natural wetlands, to reduce pollution of drainage water.
- **Saving irrigation water** and improving water efficiency through localized or alternating irrigation techniques.
- **Encourage direct seeding**, to improve soil structure and fertility, while limiting soil erosion.

Faced with the increasing scarcity of water resources and the effects of climate change, the sustainability of Moroccan rice farming now depends on its ability to adopt water-saving practices that respect natural ecosystems.
With this in mind, the National Institute of Agronomic Research (INRA), in partnership with Mohammed V University of Rabat, Ibn Tofail University of Kenitra, and Mohammed VI Polytechnic University (UM6P) of Benguérir, is implementing within the framework of the PRIMA, NPP-SOL and PROMEDRICE projects, a program aimed at developing good cultural practices and enhancing the natural wetlands adjacent to rice fields, within the Experimental Estate of Sidi Allal Tazi.

PRIMA FLAGSHIP PROJECTS

NPP-SOL: Modelling and technological tools to prevent surface and ground-water bodies from agricultural non-point source pollution under Mediterranean conditions. This project develops nature-based solutions to prevent diffuse pollution from agriculture and protect water resources.

PROMEDRICE: Effective farming practices to protect water resources in Mediterranean rice-based agroecosystems. This project promotes innovative agricultural practices adapted to Mediterranean conditions, including no-till and drip irrigation.

OBJECTIVES OF THE INFORMATION DAY

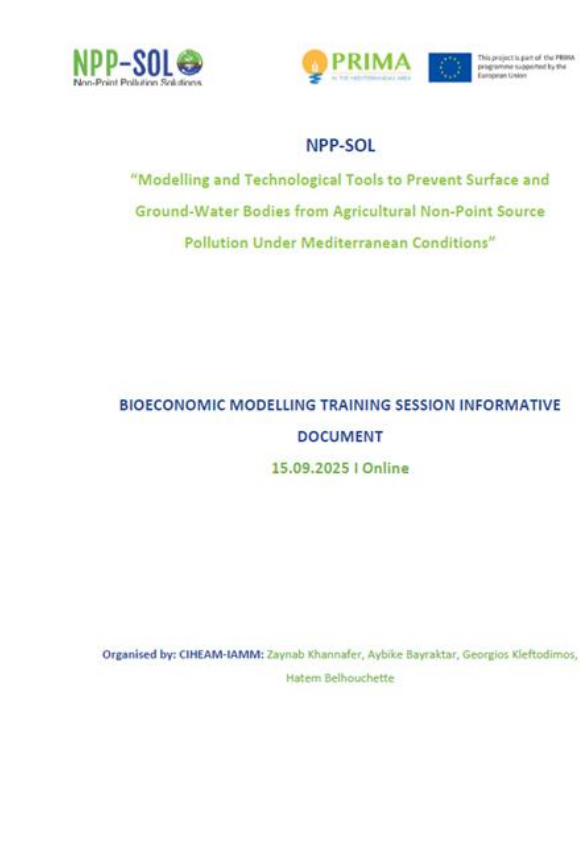
- Present the results of the program for the development of new national rice varieties.
- Promote good irrigation and tillage practices adapted to water management in a context of scarcity.
- Raise awareness of the importance of natural wetlands in the sustainable management of drainage water.
- Promote dialogue between farmers, researchers and decision-makers to co-construct sustainable and resilient strategies.



SCHEDULE OF THE DAY

The day will be held in the form of:
An opening plenary session, dedicated to the national challenges of the rice sector.
A presentation of the PRIMA projects, their approaches and the main results obtained.
A field visit, to illustrate the innovative practices and experiments carried out on the Sidi Allal Tazi site.

This information day is intended to be a platform for exchange and knowledge transfer between research, institutions and producers. By promoting nature-based solutions and technical innovations, it aims to strengthen the environmental sustainability and socio-economic resilience of Moroccan rice farming, in a context marked by climate change and the scarcity of water resources.



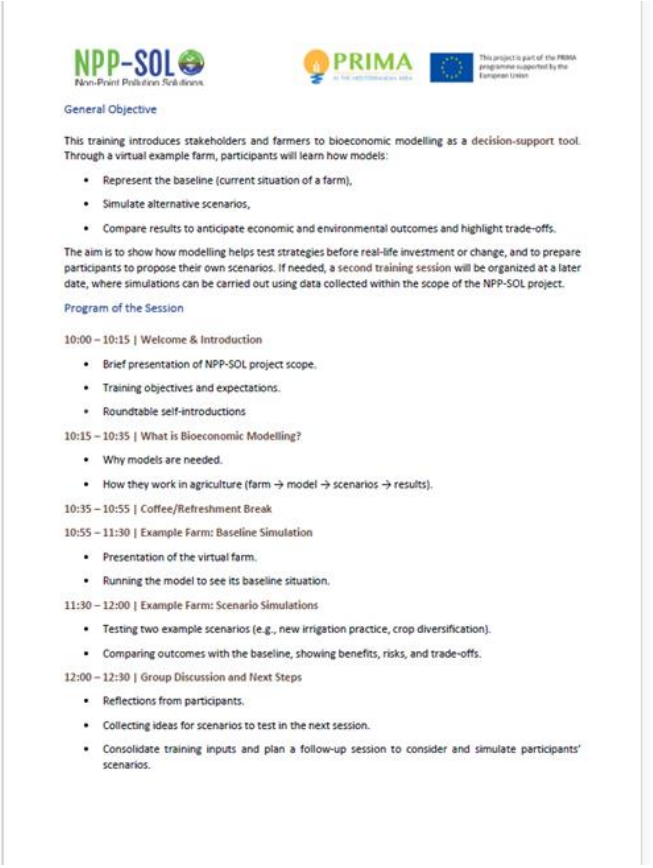
NPP-SOL

"Modelling and Technological Tools to Prevent Surface and Ground-Water Bodies from Agricultural Non-Point Source Pollution Under Mediterranean Conditions"

BIOECONOMIC MODELLING TRAINING SESSION INFORMATIVE DOCUMENT

15.09.2025 I Online

Organised by: CIHEAM-IAMM: Zaynab Khannafer, Aybike Bayraktar, Georgios Kleftodimos, Hatem Belhouchette



General Objective

This training introduces stakeholders and farmers to bioeconomic modelling as a decision-support tool. Through a virtual example farm, participants will learn how models:

- Represent the baseline (current situation of a farm),
- Simulate alternative scenarios,
- Compare results to anticipate economic and environmental outcomes and highlight trade-offs.

The aim is to show how modelling helps test strategies before real-life investment or change, and to prepare participants to propose their own scenarios. If needed, a second training session will be organized at a later date, where simulations can be carried out using data collected within the scope of the NPP-SOL project.

Program of the Session

10:00 – 10:15 | Welcome & Introduction

- Brief presentation of NPP-SOL project scope.
- Training objectives and expectations.
- Roundtable self-introductions

10:15 – 10:35 | What is Bioeconomic Modelling?

- Why models are needed.
- How they work in agriculture (farm → model → scenarios → results).

10:35 – 10:55 | Coffee/Refreshment Break

10:55 – 11:30 | Example Farm: Baseline Simulation

- Presentation of the virtual farm.
- Running the model to see its baseline situation.

11:30 – 12:00 | Example Farm: Scenario Simulations

- Testing two example scenarios (e.g., new irrigation practice, crop diversification).
- Comparing outcomes with the baseline, showing benefits, risks, and trade-offs.

12:00 – 12:30 | Group Discussion and Next Steps

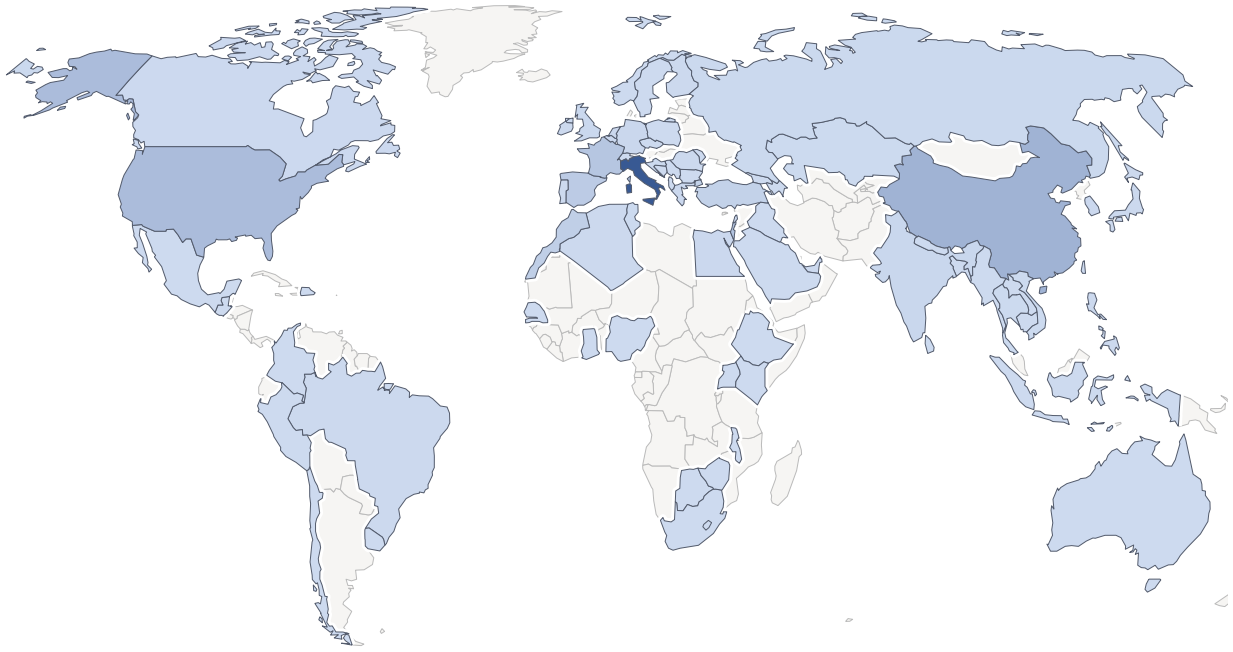
- Reflections from participants.
- Collecting ideas for scenarios to test in the next session.
- Consolidate training inputs and plan a follow-up session to consider and simulate participants' scenarios.

ANNEX 4 - NPP-SOL website analytics

CIHEAM MONTPELLIER

NPP-SOL | De 2024-06-30 à 2026-10-27 | Toutes les visites

3 358 visites



Pays

Mondialement | Visites

Continent

Continent	Visites
Europe	52,1 % 1 751
Asie	34,5 % 1 159
Amérique du Nord	8,1 % 271
Afrique	4,5 % 150
Amérique du Sud	0,6 % 19
Océanie	0,1 % 5
Amérique centrale	0,1 % 3

76 pays différents

Langage du navigateur

Langue	▼ Visites
Anglais	32,6 % 1 096
Italien	25,4 % 853
Inconnu	12,6 % 424
Chinois	9,7 % 327
Français	9,5 % 318
Espagnol	2,8 % 94
Turc	2,7 % 89
Hébreu	1,5 % 51
Catalan	1,2 % 39
Russe	0,6 % 21

1 - 10 de 27

Fournisseurs

Fournisseur	▼ Visites
Inconnu	53,8 % 1 808
Wadsl	10,6 % 357
Iamb	7,3 % 245
Fastwebnet	3,8 % 127
Vodafone	3 % 101

1 - 5 de 172

Note: Fournisseur inconnu signifie que l'adresse IP n'a pas pu être recherchée. Voir cette FAQ.

Pays

Pays	▼ Visites
Italie	35,4 % 1 190
Singapour	14,3 % 479
Chine	10,4 % 348
États-Unis	7,8 % 262

Pays	Visites
Israël	6,1 % 206

1 - 5 de 76

Région

Région	Visites
Inconnu	37,7 % 1266
Abruzzo, Italie	10,9 % 367
Sardegna, Italie	6,8 % 227
Puglia, Italie	4,6 % 153
Tall Abīb, Israël	2,5 % 85

1 - 5 de 242

Ville

Ville	Visites
Inconnu	38,8 % 1304
Cagliari, Sardegna, Italie	4,4 % 148
San Giovanni Teatino, Abruzzo, Italie	2,5 % 85
Montesilvano Marina, Abruzzo, Italie	2,1 % 69
Ashburn, Virginia, États-Unis	2 % 68

1 - 5 de 434

CIHEAM MONTPELLIER

NPP-SOL | De 2024-06-30 à 2026-10-27 | Toutes les visites

Graphique des dernières visites



Choisissez les paramètres

Visites

Récapitulatif des visites

Visites 3 358 +100 %	Pages vues 7 630 +100 % 6 037 pages vues uniques	Temps moyen sur le site web 2 min 58s +100 %	Recherches 3 +100 % 1 mots-clés uniques
Taux de rebond 63 % +100 %	Téléchargements 466 +100 % 396 téléchargements uniques	Actions par visite 2,6 +100 %	Liens sortants 650 +100 % 596 liens externes uniques
Nombre maximum d'actions en une visite 72 +100 %			