

EXPLORING THE RELATIONSHIPS BETWEEN IRRIGATION AND AGROECOLOGY IN OCCITANIE (FRANCE) : THE EXPERIENCE OF THE TAI-OC PROJECT

EXPLORER LES RELATIONS ENTRE IRRIGATION ET AGROECOLOGIE EN OCCITANIE (FRANCE) : EXPERIENCE DU PROJET TAI-OC

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ABSTRACT

Despite the fact that Irrigation and agroecology are both presented as contributing to climate change adaptation, they fall under different disciplines, communities, policies and discourses and are rarely considered in conjunction with one another. The present communication presents the TAI-OC project which aims to explore the interactions between irrigation and agroecology at several scales, and test the hypothesis that irrigation and agroecology could coexist and reinforce each other in order to improve agricultural systems.

The TAI-OC project is led in Occitanie, a southern region of France, affected by severe water constraints increasing with climate change. Irrigation is implemented by 26% of farmers and water-related challenges concern several cropping systems. We focused on three of them: arable cropping, viticulture, and vegetable growing.

The project adopted a multi-scale, multi-level approach to account for the multi-scale nature of agroecology, with experiments conducted at the field scale, surveys at the farm scale and value-chain scale, and modelling and participatory approaches at the territorial scale.

The present communication gives an overview of the first results of the project which are detailed in several communications in the same conference. It gives a portrait of irrigated agroecological farms, precises the motivations of farmers to agroecological transition and the support they have, and gives insights on the specific role of irrigation. It shows how agroecological practices influence water flow in the soil and can lead to savings in irrigation water, and attests that irrigation can serve the cause of agroecology by enabling crop diversification, producing more biomass returned to the soil, regulating the microclimate, and so on. At the territorial scale, a multi-actor workshop serie was conducted to launch an action plan for the agroecological transition of a water-dependent region, and a modelling approach is being developed to integrate water considerations in food territorial projects.

Keywords: Irrigation and agroecology; climate change adaptation; water-related challenges; agroecological practices; crop diversification.

RESUME

Bien que l'irrigation et l'agroécologie soient toutes deux présentées comme les facteurs contribuant à l'adaptation au changement climatique, ils font partie de différents disciplines, communautés, politiques et discours et sont rarement considérés conjointement. La communication actuelle présente le projet TAI-OC qui vise à explorer les interactions entre l'irrigation et l'agroécologie à plusieurs échelles, et à tester l'hypothèse selon laquelle l'irrigation et l'agroécologie pourraient coexister et se renforcer mutuellement afin d'améliorer les systèmes agricoles.

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Le projet TAI-OC est mené en Occitanie, région située au sud de la France, touchée par de graves contraintes hydriques qui augmentent avec le changement climatique. L'irrigation est mise en œuvre par 26% des agriculteurs et les défis liés à l'eau concernent plusieurs systèmes de culture. Nous avons mis l'accent sur trois d'entre eux : la culture des terres arables, la viticulture et la culture de légumes.

Le projet a adopté une approche multi-échelles et multi-niveaux pour tenir compte de la nature multi-échelle de l'agroécologie, avec des expériences menées à l'échelle de la parcelle, des enquêtes à l'échelle de l'exploitation agricole et de la chaîne de valeur, ainsi que des approches de modélisation et participatives à l'échelle du territoire.

Cette communication donne un aperçu des premiers résultats obtenus du projet qui sont détaillés dans plusieurs communications de la même conférence. Il donne un portrait des exploitations agroécologiques irriguées, précise les motivations des agriculteurs en ce qui concerne la transition agroécologique et le soutien dont ils disposent, et donne un aperçu du rôle spécifique joué par l'irrigation. Il montre la manière dont les pratiques agroécologiques influencent le débit d'eau dans le sol et peuvent conduire à des économies d'eau d'irrigation, et affirme que l'irrigation peut servir la cause de l'agroécologie en permettant la diversification des cultures, produisant plus de biomasse retournée au sol, régulant le microclimat, entre autres. À l'échelle territoriale, une série d'ateliers multi-acteurs a été organisé pour lancer un plan d'action pour la transition agroécologique d'une région dépendante de l'eau, et une approche de modélisation est en cours d'élaboration pour intégrer les considérations liées à l'eau dans les projets territoriaux alimentaires.

Mots-clés : Irrigation et agroécologie; Adaptation au changement climatique; Défis liés à l'eau; Pratiques agroécologiques; Diversification des cultures.

INTRODUCTION

Both Irrigation and agroecology have their own communities, policies and discourses (Léauthaud et al. 2025) but share the fact that they are considered as tools for climate change adaptation, for example in the IPCC's Sixth Assessment Report (Calvin et al. 2023).

According to (Gliessman 2015), agroecology (AE) is the science of applying ecological concepts and principles to the design and management of sustainable agricultural and food systems. It was first based on the diversification of crops and a set of agricultural practices that harness and build on ecological processes, which leads to a reduction in the use of external chemical inputs (Wezel, 2014). But agroecology evolved over years to expand in scope from a focus on fields and farms to encompass whole agriculture and food systems (HPL 2019). This multidimensional nature has led to AE being viewed as a "transdisciplinary, participatory and action-oriented approach across ecological, agricultural, food, nutritional and social sciences" (Wezel et al. 2020), which seeks to redefine food production and the entire food system. According to several international reports (IPES-Food 2015, IPES-Food 2019, HPL 2019, FAO 2018), the provision of ecosystem services confers to AE the ability to contribute to the achievement of the EU's objectives regarding ecosystem protection, climate change adaptation, biodiversity loss, nutritional health and inequalities of all kinds. As such, AE is of interest to both policy-makers and a wide range of stakeholders (from farmers to associations, and from the food industry to consumers).

For its part, irrigation enables the cultivation of certain crops that are more sensitive to water stress. As such, it is widely recognised as a factor in agricultural diversification and is also seen as a measure for adapting to the effects of climate change (Siebert et al., 2014 ; Calvin et al. 2023). It is thus perceived, by both managers and farmers, as a positive factor that ensures food security, rural employment and develops local and national economies. It is therefore anticipated that irrigation will expand in the coming decades to meet rising food demand and address a range of societal challenges, particularly in Occitanie (e.g. the 2018–2030 Departmental Irrigation Development Plan (SDDI) 'Hérault Irrigation'). Although irrigation and agroecology are both attracting growing interest due to their shared objectives regarding climate change adaptation and their laudable ambitions to address current societal challenges, they are rarely considered in conjunction with one another. This is probably because the high potential for

environmental impact of current irrigated systems has often been highlighted (Perret & Payen, 2020): intensive cropping and farming systems with externalities including a reduction in crop diversity due to specialisation, increased use of external inputs such as pesticides and fertilisers, indirect impacts on global warming (high energy consumption for water pumping, use of plastic in drip irrigation systems), the artificialisation of landscapes, etc..

The natural tendency would be to move towards the agroecologisation of irrigated systems. (Leauthaud et Leenhardt 2025) show that irrigation and agroecology share common concepts and principles and could be reconciled if irrigation practices interacted with agroecological practices to improve ecosystem services. However, they also argue that the beneficial role that irrigation could play in agroecological systems is still far from being fully understood. Indeed, very few scientific studies have examined agroecology and irrigation together (Leauthaud et al. 2025) and the list of research questions to be addressed in order to effectively plan for and support the agroecological transition of irrigated systems is long (Leauthaud and Leenhardt, 2025), as fundamental changes appear to be essential across all areas (political, socio-economic, environmental and technological).

The present paper provides an overview of the TAI-OC project, which aims to address the knowledge gap regarding the link between agroecology and irrigation at all scales, based on the premise, as highlighted by (Aguilera et al. 2020), that it is necessary to produce healthy, diverse and sustainable food and diets at the level of a local food system in the context of climate change, particularly in Mediterranean regions .

OBJECTIVES OF THE PROJECT

Three main objectives drive the TAI-OC project (Fig. 1).

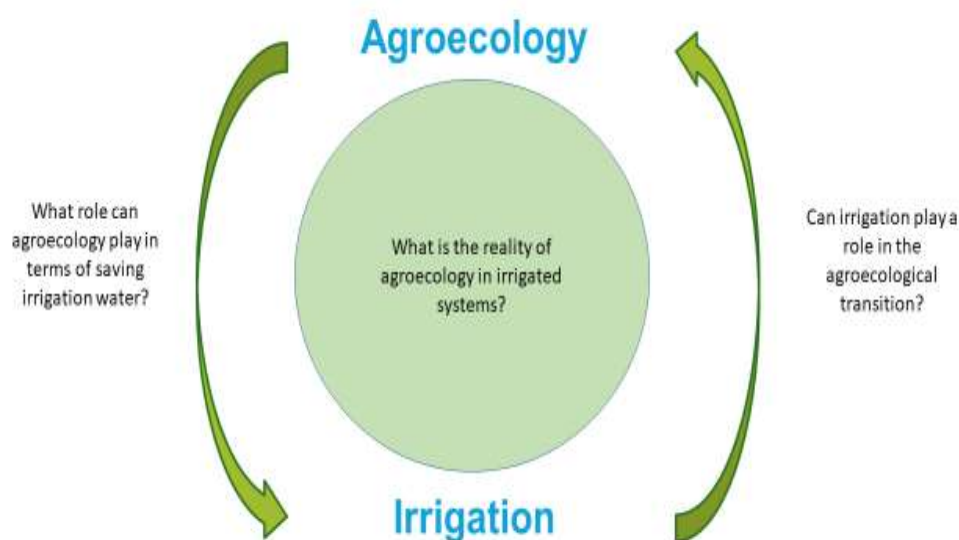


Figure 1. Conceptual frame of the TAI-OC project including its main objectives

The first objective is to gain an understanding of the reality of agroecology in irrigated systems. This diagnostic phase of the project aims to challenge the common misconception that irrigation and agroecology are incompatible, and to get illustrations and examples of how agroecology is implemented, supported and adopted in irrigated systems.

The second objective is to investigate how agroecological systems affect water flow in the soil and to what extent they help improve soil water retention and conserve irrigation water. This second objective aims to address the recurring concern of agricultural professionals, who are under pressure to find solutions to water scarcity.

The third objective is based on an opposing viewpoint and seeks to determine whether and how irrigation could play an active role in the agroecological transition of agricultural systems.

STUDY AREA

The TAI-OC project is led in Occitanie region. Located in South France, this region is affected by negative effects of climate change such as severe water constraints, droughts and heatwaves. Irrigation has become a critical tool, implemented by a high proportion of farmers. This reliance on water places irrigators at the heart of regional water scarcity management, at the intersection of socio-environmental conflicts and climate change adaptation strategies.

With 3.1 million hectares of cultivated lands in 2020 (DRAAF Occitanie 2021), Occitanie is characterised by diverse cropping systems, each with distinct water-related challenges. In the west, where arable crops prevail, maize is heavily irrigated during the summer, and therefore, at the origine of controversies and conflicts over resource sharing. On the eastern side along the Mediterranean coast, viticulture is the main activity. A recent surge in irrigated vineyard areas and the resulting demand for new water supply infrastructures have raised significant questions. Finally, although vegetable, fruit and nut productions cover smaller areas across the region, all three are heavily water-dependent. Vegetable growing, in particular, is regarded as a priority for local food security and the territorial agroecological transition. The TAI-OC project chose to focus on vegetables, arable crops and viticulture.

APPROACH

The TAI-OC project was initiated in November 2022. It is ongoing until end 2027. It gathers 6 research units and is led in partnership with a water manager and an agricultural extension service. Scientists are mainly agronomists and economists.

The TAI-OC project adopted a multi-scale, multi-level approach to account for the multi-scale nature of agroecology, which has gradually expanded from the scale of the plot, field, or animal to the farm or agroecosystem, ultimately encompassing the entire food system (HPLÉ, 2019). Accordingly, various actions were carried out at these three spatial levels using methods specific to each (Fig. 2).

1. At the field scale, experiments were conducted at stations or on farms to monitor and analyse the effect of agroecological practices on soil water status and irrigation water consumption.
2. At the farm scale, surveys of different types were realised. A short on-line survey was used to identify irrigated agroecological farms. Different peer-to-peer semi-directed interviews of irrigators involved in agroecology were conducted to learn about their agricultural practices and motivations, and identify the drivers and barriers to agroecological transition. Other interviews of farmers and support services staff were conducted to learn about the support to agroecological transition offered to irrigators.
3. At the regional level, two approaches were adopted—modeling and participation—either used in combination or separately. Participatory workshops bringing together stakeholders were organized with the aim of initiating an agroecological transition process in their region, which faces recurring water shortages. This required the use of models to assess the impacts of the jointly developed scenarios. A modeling approach is also underway in another territory to incorporate water availability levels into food self-sufficiency calculations (which are used for the establishment of local food systems).

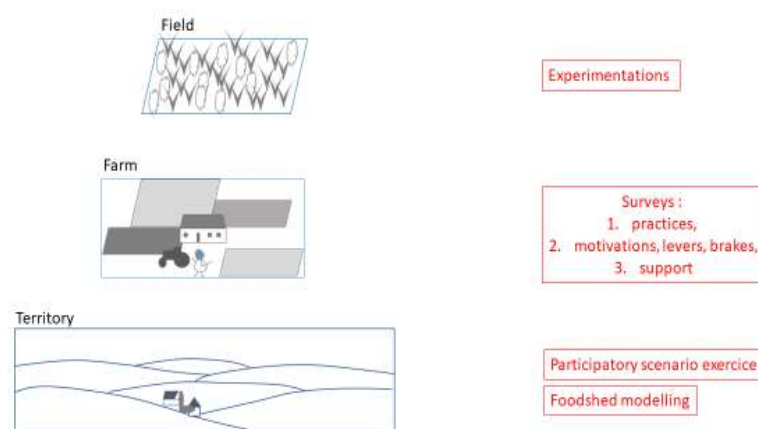


Figure 2. Study scales and corresponding methods used in the project.

FIRST RESULTS

Irrigated farms engaged in agroecology in Occitanie

The various farm surveys have allowed us to draw an initial portrait of agroecology in irrigated systems in Occitania, summarised below in Fig. 3.

A portrait of irrigated agro-ecological farms

Agroecology is a reality on irrigated farms in Occitania. In our online survey, 89 irrigators reported that they were engaged in an agro-ecological approach (Auger et al., IFSA). The level of commitment to the transition varies considerably from one farm to another (Morardet et al., ICID2026), but every farm meets one or more agroecological objectives, with the primary focus on improving soil fertility, reducing erosion and soil tillage, and improving working conditions (Auger et al., IFSA).

The 36 irrigators we interviewed described an average of nine (9) agro-ecological practices (or coherent combinations of practices) per farm. These agro-ecological practices proved to be diverse and multifunctional. The whole set of listed practices covers a wide range of goals, especially plant protection, management of mineral elements and soil organic status, soil preparation, and water management. These practices are very often multifunctional. For example, an organic mulching practice saves water by reducing soil evaporation, but it also improves the soil's organic matter stock and can sometimes, depending on the mulching product used, contribute to plant protection (Leenhardt et al., IFSA).

Commitment to collective initiatives is also a strong marker of these farms (Auger et al., IFSA), and these collective dynamics of sharing equipment, experiences, and training appear as a means to develop a form of solidarity and a sense of belonging among farmers (Graveline et al., submitted).

Motivations and support to agroecological transition

Regardless of the farms' orientation, the motivations for the agroecological transition of irrigating producers are primarily environmental preservation (Morardet et al., ICID2026; Auger et al., IFSA). Producer health also emerges (Auger et al., IFSA), as does the desire to transmit the farm to the next generation, and adaptation to climate change (Morardet et al., ICID2026). The latter motivation is especially strong among wine-growers, whereas preserving the economic profitability of the farm is a

particularly important driver in arable crops, and vegetable growers are mainly motivated by reducing health impacts and improving product quality (Morardet et al., ICID2026; Auger et al., IFSA). Among vegetable growers, however, motivations vary according to their level of commitment to agroecology. When the agroecological level is low, motivations are more linked to health considerations or consumer demand; when farmers are highly committed, they tend to cite motivations related to climate-change adaptation, water savings, and the environment (Morardet et al., ICID2026; Graveline et al., submitted). Support for the agroecological transition is just one of several factors explaining practice changes among irrigators, but its role is considered important for access to, sharing of, and diffusion of knowledge, and it is especially critical at the installation stage.

Yet, a lack of skills in traditional support structures, the absence of a systemic approach essential to agroecology, the strong influence of public policies that are too narrowly focused, or the frequent turnover of advisors can make “classical” support a barrier to the agroecological transition, pushing motivated farmers toward informal networks or private consulting (Graveline et al., submitted). In particular, support services rarely address irrigation explicitly, and the links between agroecology and irrigation remain limited—even in a region where irrigation plays a major role. In the end, the most agroecologically engaged farmers are those who have benefited both from a larger number of support services and from assistance focused on a deeper redesign of the agricultural system (Guichet et al., ICID2026). Value-chains can also play a positive role in supporting farmers’ agro-ecological transition by producing and disseminating reference materials, articulating different intervention registers, organizing access to technical and material resources, and generating political and economic legitimization of agro-ecological practices. However, these mechanisms can, in some cases, lead to lock-ins that leave farmers with little room for maneuver. Two support approaches for the agroecological transition have been identified: a “levers” approach, which relies on mobilising targeted technical solutions for specific practices (e.g., soil work, variety choice, input reduction, or specific equipment) without questioning the overall organisation of the farm; and, more rarely, an approach based on a more systemic conception of agroecology, which involves a combination of several levers and a long-term perspective (Graveline et al., submitted).

The irrigation role

When asked about the role of irrigation in the agroecological transition, farmers expressed different viewpoints. For some wine-growers, irrigation is seen as a form of “maladaptation,” whereas for other producers—particularly those in arable crops—it provides a form of security—through stable yields and the possibility of high-value production—that allows them, with lower risk, to experiment with new agroecological practices and to involve other parts of their farm in agroecology (Morardet et al., ICID2026).

Even if they do not spontaneously mention the link between irrigation and the practices they implement within their agroecological approach, when specifically questioned about their agroecological practices, farmers acknowledge a connection between many of their practices and irrigation. This link concerns 42 % of the cited practices and takes several forms. Some practices are directly related to irrigation management (e.g., irrigation decision rules, frequency and amount of water inputs). Others help to save irrigation water, either directly (e.g., choosing drought-resistant varieties) or indirectly by improving water storage in the soil (e.g., mulching, organic matter additions). Still others depend on the water status of the soil-plant system and are therefore favoured by irrigation (e.g., establishing cover crops under dry conditions) (Leenhardt et al., IFSA).

Experimental demonstrations

Our ongoing experimental work aims to understand and quantify the impacts of agro-ecological practices on the hydraulic functioning of the soil-plant continuum (dynamic monitoring of various soil functions), on the agronomic performance, and on irrigation management. It also aims at characterizing the role of irrigation in the implementation of agro-ecological practices.

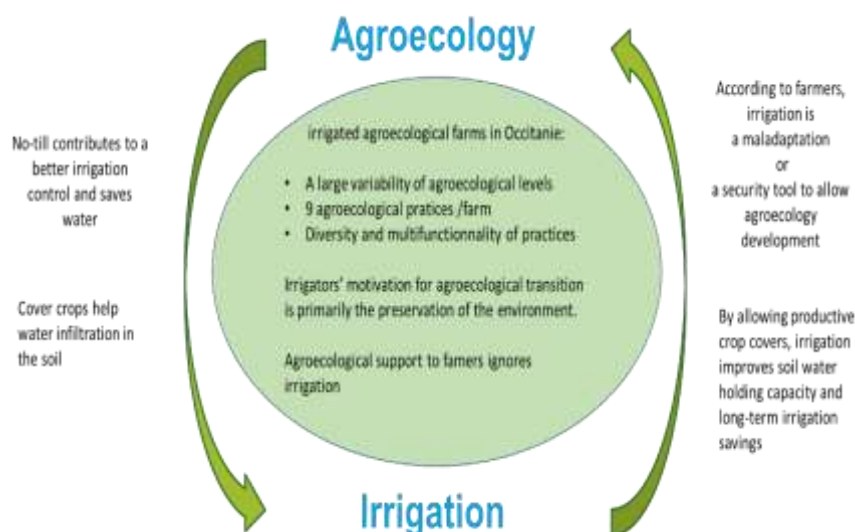


Figure 3. Key diagnosis elements from the TAI-OC project about irrigated agroecological farming in Occitanie.

Soil cover practices

Our trials in vegetable production, viticulture and arable farming all consistently show that soil cover practices – whether using living or dead cover crops, applied over time or across an area – promote water infiltration and limit weed growth compared to bare soil. However, in viticulture, the timing of cover crop management (establishment and removal) must be carefully considered so as not to compromise the vine's water supply (TAI-OC, 2025). Logically, in a Mediterranean climate, irrigation could prove useful to ensure the establishment of cover crops and allow for greater production of biomass returned to the soil, thereby improving the storage of carbon and organic matter. Our initial results from a large-scale trial tend to support this hypothesis and show that, in a context of water scarcity during the summer, a single irrigation at the time of cover crop emergence may represent the best compromise between biomass production and water productivity (Mussillon et al., ICID2026; Mussillon et al., 2026).

Soil tillage

The role of soil tillage has also been clarified. In vegetable production, both zero-tillage and shallow-tillage combined with large organic-matter inputs appear to have positive effects on the hydraulic and biological functioning of soils. For these treatments, irrigation scheduling can be more flexible thanks to the soil's buffering capacity, and water applications are reduced relative to the control plot without compromising yields or product quality over time (Guillot et al., ICID2026). Strict zero-tillage, however, may eventually lead to compaction or weed encroachment. Our recent observations, drawn from a five-year trial of conservation agriculture (a combination of no-till farming, permanent ground cover and a long, diversified crop rotation) in arable farming, nevertheless demonstrate the value of adapting soil management practices to the specific context, moving from strict no-till farming to an approach of minimal and superficial disturbance. This evolution reconciles the soil-health benefits of conservation agriculture with better control of agronomic constraints, while maintaining irrigation efficiency and water productivity under increasing climatic and hydraulic pressures (Domínguez et al., ICID2026).

Territorial transition to agroecology

The agro-ecological transition of water-constrained territories is not only the result of farmers' motivation and action to adopt agro-ecological practices at a field scale, but also depends on political and collective decisions involving a variety of actors and institutions. The TAI-OC project contributes to supporting this territorial agro-ecological transition through two notable actions.

An agroecological scenario for a water-dependant territory

The first action consisted of developing and leading a process to bring local stakeholders together so that they could reach a shared future vision for their territory and be ready to draft an action plan. This work was carried out in a western-Occitanie area (Pays de Trie et du Magnoac) that faces several challenges linked to agriculture and irrigation: maintaining agriculture on the territory, ensuring water access for the different farming sectors, protecting water quality, preserving soil fertility, and adapting to climate change. The collective produced a territorial diagnosis, generated three scenarios representing different visions of agroecology based on the level of political support and the availability of water for agriculture, and evaluated them using a set of impact indicators. The group of stakeholders chose the scenario it considered most likely given the political context (no favorable agro-ecology policy) while remaining optimistic about future water availability. To achieve this credible and desirable scenario, the collective drafted a preliminary action plan that includes measures to safeguard water resources and ensure balanced allocation, actions to support changes in value-chains and agricultural practices, and collective and political initiatives. A lead partner was identified to continue the collective process through the finalisation and implementation of the action plan. (Debourg et al., in progress)

Integrating water and irrigation in territorial food projects

The second action focuses on Territorial Food Projects (Projet Alimentaire Territorial – PAT), which can be seen as a response to the agroecology-driven goal of developing sustainable food systems. An initial observation is that water issues are only marginally addressed in Occitanie's PATs in general, and specifically in the Carcassonne PAT (Gasperini, 2025). Since PATs use a calculation of the territory's food self-sufficiency as an element of the initial diagnosis and as an indicator to improve through developed actions, a Ph-D study investigates how the availability of water for food-producing agriculture is taken into account (Freiburger et al. submitted). A modelling effort is currently under way to examine how estimates of the food self-sufficiency of the Carcassonne agglomeration evolve depending on the extent to which irrigation and water-resource availability are considered in the analysis.

Conclusion

The TAI-OC project is still ongoing, but it has already provided an initial overview of irrigated farms practising agroecology. This assessment was essential to dispel the notion that agroecology is incompatible with irrigation. We can therefore see that not only does agroecology influence water flow in the soil and can lead to savings in irrigation water, but also that irrigation can serve the cause of agroecology by enabling crop diversification, producing more biomass returned to the soil, regulating the microclimate, and so on. This has led us to propose the concept of multi-purpose irrigation (Léauthaud et Leenhardt, 2025).

Beyond this assessment, ongoing research aims to better quantify the reciprocal impact between irrigation and agroecology, both in terms of water flows and biomass production, and in economic terms. This assessment is essential to provide answers to the farming sector, which seeks to know whether it is worth the (financial) cost of adopting agroecology, but also to the society, who may see agroecological practices as a means of storing carbon in the soil, reducing greenhouse-gas emissions, limiting runoff and therefore erosion and flood severity, decreasing the use of plant-protective products and consequently water and soil pollution, cutting irrigation water demand, and even improving biodiversity and soil fertility. While the societal benefits appear clear, even if they have not yet been fully quantified, the financial incentive for farmers to adopt agro-ecological practices is not obvious. This raises the question of introducing a public-policy instrument to financially compensate farmers for losses incurred or to reward them for additional effort. Although such instruments are well known (investment aid, income-support measures), defining their specific modalities—amount, duration of payments, and whether they are fixed or tapering over time—remains a project in its own right (Leenhardt et al., 2025). In addition to this focus on the field and the farm, the TAI-OC project has also launched research at the level of value chains and territories, which should be continued and expanded, because the ecological transition must be pursued at all levels to generate a reciprocal and virtuous knock-on effect.

References

- Auger et al. Differentiation of irrigators committed to agroecology in Occitanie (France). Abstract for IFSA 2026 Conference in Montpellier (France)
- Debourg B., Hossard L., Morardet S., Luzaretta A., Rouault P., Leenhardt D. Combining design fiction, exploratory and backcasting scenarios to explore desirable futures of agricultural systems/territories. To be submitted to Futures
- Dominguez Bohorquez J. D. et al. Adoption of adaptive irrigated conservation agriculture in a French Mediterranean system: Five-year assessment of soil properties and crop-water performance. Abstract for ICID 2026 Conference in Marseille (France)
- Freiburger D., Sanz-Sanz E., Napoléone C., Leauthaud C., Leenhardt D. Thinking water in spatial foodshed models. A systematic literature review of methodological approaches. Submitted to Italian Journal of Agronomy.
- Gasperini C., 2025. Agroecology and water: how are they integrated into the Territorial Food Project of the Carcassonne agglomeration area? Master Thesis, ISARA – WUR, Farming Systems Ecology Group. Wageningen, 88p
- Graveline N., Amichi H., Morardet S., Bouvard A., Degroote A., Loubier S. Agroécologie en agriculture irriguée : Motivations, freins et leviers des exploitations et des filières. Submitted to Sciences, Eaux et Territoires.
- Guichet E. et al. Supporting Agroecological Transition in Irrigated Farming Systems: Insights from a Case Study in Southwestern France. Abstract for ICID 2026 Conference in Marseille (France)
- Guillot E. et al. Agroecological soil management in vegetable production, what impact on soil water dynamics and irrigation scheduling? Abstract for ICID 2026 Conference in Marseille (France)
- Leenhardt et al. What are the agroecological practices of irrigators? A study in Occitanie (France) Abstract for IFSA 2026 Conference in Montpellier (France)
- Morardet S. et al. Agroecological transition in irrigated systems in the Occitanie Region (South of France): Diversity of motivations, barriers and levers across cropping systems. Abstract for ICID 2026 Conference in Marseille (France)
- Mussillon H. et al. Influence of different irrigation regimes on cover crops biomass production and water productivity. Abstract for ICID 2026 Conference in Marseille (France)
- Mussillon H., Wittling C., Pages F., Deschamps N., Lecloux E., Alletto L., 2026. Influence of irrigation and other management practices on ecosystemic services generated by cover crops. Abstract for 19th congress of the European Society of Agronomy, Tartu (Estonia).
- TAI-OC, 2025. Note d'avancement annuelle 2025. Internal Report.
- Other References
- Aguilera, Eduardo, Cipriano Díaz-Gaona, Raquel García-Laureano, et al. 2020. « Agroecology for adaptation to climate change and resource depletion in the Mediterranean region. A review ». *Agricultural Systems* 181 (mai): 102809. <https://doi.org/10.1016/j.agsy.2020.102809>.
- Calvin, Katherine, Dipak Dasgupta, Gerhard Krinner, et al. 2023. IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland. First. Avec Hoesung Lee. Intergovernmental Panel on Climate Change (IPCC). <https://doi.org/10.59327/IPCC/AR6-9789291691647>.
- DRAAF Occitanie. 2021. « Occitanie : 2ème région agricole de France ». https://draaf.occitanie.agriculture.gouv.fr/IMG/pdf/version_def_etudes_ra_region_v6_cle014584.pdf.
- Gliessman, Stephen R. 2015. *Agroecology: The Ecology of Sustainable Food Systems*. Third edition. Avec Taylor and Francis. CRC Press, an imprint of Taylor and Francis.
- Leauthaud, C., et D. Leenhardt. 2025. « Towards Multiservice Irrigation for an Agroecological Future ». *Npj Sustainable Agriculture* 3 (1): 55. <https://doi.org/10.1038/s44264-025-00094-w>.
- Leenhardt D, C Leauthaud, S Bouarfa, S Loubier, L Alletto, J Dominguez, N Urruty, C Wittling, Claire Lesur-Dumoulin, Esther Guillot, Mathieu Marguerie, 2025. L'irrigation et l'agroécologie peuvent-elles faire bon ménage ? Vers une irrigation multiservice. In : Sami Bouarfa, Christelle Fontaine, Marielle Montginoul, Thomas Pelte, Eric Sauquet (Eds). *A l'ère de l'anthropocène, comment partager l'eau en France ? Ouvrage QUAE Collection Matière à débattre et décider*, ISBN 978-2-7592-4098-2. p 135-147.
- Wezel, Alexander, Barbara Gemmill Herren, Rachel Bezner Kerr, Edmundo Barrios, André Luiz Rodrigues Gonçalves, et Fergus Sinclair. 2020. « Agroecological Principles and Elements and Their Implications for Transitioning to Sustainable Food Systems. A Review ». *Agronomy for Sustainable Development* 40 (6). <https://doi.org/10.1007/s13593-020-00646-z>.