

Quick Reference Guide (FR)

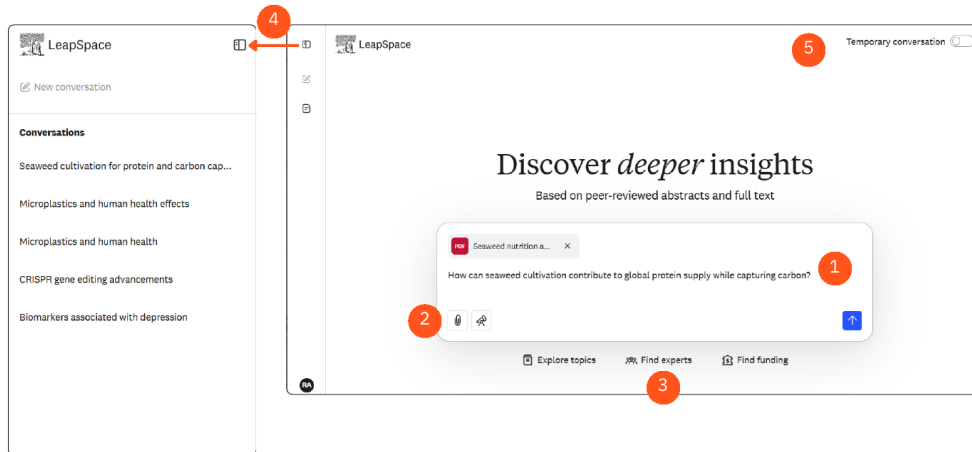


ELSEVIER

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1. Démarrer votre recherche



1. Formulez votre requête — Posez simplement votre question ou décrivez votre besoin de manière naturelle et conversationnelle. L’outil prend en charge des recherches complexes, y compris dans des domaines interdisciplinaires.

2. Ajoutez vos propres fichiers — Téléchargez jusqu’à cinq fichiers par conversation afin d’enrichir les réponses de l’IA avec vos propres travaux ainsi qu’avec la littérature scientifique publiée.

3. Choisissez votre type de recherche — Par défaut, la recherche explore un sujet. Vous pouvez également lancer une recherche pour identifier des experts du domaine ou des opportunités de financement.

4. Retrouvez vos recherches précédentes — L’historique conversationnel offre une vue d’ensemble de vos précédentes recherches LeapSpace dans un onglet situé à gauche de l’écran. Vous y trouverez jusqu’à 10 recherches récentes, avec la possibilité de charger un historique plus ancien. LeapSpace conserve jusqu’à 200 conversations, avec un maximum de 20 échanges par conversation.

5. Démarrez une conversation temporaire — Le mode de conversation temporaire est conçu pour les recherches exploratoires, sensibles ou ponctuelles, sans conservation de l’historique des échanges.

2. Analyser les résultats de recherche

Copilot steps

1. Creating a plan to respond to your query
2. Performing keyword search
Using data from **Scopus**
(seaweed OR macroalgae OR kelp) AND (protein OR "biochemical yield" OR nutrit* OR amino acid*) AND (cultivat* OR farm* OR aquaculture OR mariculture)
3. Performing natural language search
Using data from **Scopus**
How do seaweed cultivation practices enhance protein yields and support global protein supply?
4. Performing keyword search
Using data from **Scopus**
(seaweed OR macroalgae OR kelp) AND ("carbon capture" OR "carbon sequestration" OR "blue carbon") AND (cultivat* OR farm* OR mariculture)
5. Performing natural language search
Using data from **Scopus**
How does seaweed farming enable carbon capture and long-term carbon sequestration potential?
6. Performing keyword search
Using data from **Full text**
(seaweed OR macroalgae OR kelp) AND (ecolog* OR environmental impact* OR habitat* OR biodiversity*) AND (cultivat* OR farm* OR mariculture) AND (method* OR protocol OR "experimental design" OR result*)
7. Performing natural language search
Using data from **Full text**
What ecological impacts arise from large-scale seaweed cultivation systems?

Ask a follow-up question

LeapSpace is powered by Scopus data and fulcrum content from Elsevier and other publishers. All responses may vary in quality. [Share feedback](#)

Seaweed cultivation for protein and carbon capture

How can seaweed cultivation contribute to global protein supply while capturing carbon?

Copilot steps

2. How seaweed cultivation can boost global protein supply while capturing carbon
Seaweed cultivation contributes to **protein production** and **carbon capture** through well-documented mechanisms:
 1. **High-protein biomass generation**, especially when nutrients are optimized.
 2. **Substantial carbon fixation during growth**, with some portion stored long-term as particulate or dissolved organic carbon.
 3. **Ecosystem and climate co-benefits** such as nutrient removal, reduced emissions, and low land/water requirements.

Summary table

Domains	Key mechanisms	Evidence
Protein supply	• Wastewater/process water cultivation boosts protein content and yields. • Seaweed can reach high protein levels and serve as alternative protein. • Biofertilizers and improved extraction increase protein recoverability.	(1) , (2) , (3) , (4)
Carbon capture	• Very high primary productivity draws down CO ₂ . • Carbon exported as POC or RPOC becomes long-term storage. • Carbon sink estimates for cultivated systems are large (depending on fate of biomass).	(5) , (6) , (7) , (8) , (9) , (10) , (11) , (12)
Integrated systems & co-benefits	• IMTA systems recycle nutrients and enhance both biomass and carbon capture. • Wastewater-based cultivation removes N/P while producing protein-rich biomass.	(13) , (14) , (15) , (16)

Ask a follow-up question

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1. Examinez les étapes de réponse — LeapSpace affiche systématiquement les étapes suivies pour répondre à votre question. Cette transparence renforce la confiance et favorise une compétence essentielle à l'ère de l'IA : la pensée computationnelle, c'est-à-dire la capacité à décomposer un problème en plusieurs étapes logiques afin de le résoudre méthodiquement.

2. Consultez le Topic Overview — Le Topic Overview structuré vous permet d'identifier rapidement les principaux éléments du sujet. Le Summary synthétise les informations issues des documents les plus pertinents.

3. Posez une question de suivi — La fonctionnalité « Ask a follow-up question » vous permet d'approfondir certains points du rapport, de réorienter votre recherche vers de nouvelles perspectives ou de vous concentrer sur un aspect précis du sujet.

3. Créer des tableaux comparatifs de données probantes à partir de la littérature

Microplastics and human health

Confidence Level

High confidence that these themes represent the major open questions, as they appear consistently across numerous reviews that highlight methodological limitations, research gaps, and missing long-term human data.

If you'd like, I can also generate:

- a conceptual diagram of research gaps,
- a prioritized research agenda,
- or a more detailed breakdown of gaps by exposure route, organ system, or particle type.

Show all 33 references [Explore as a table](#) 1

Follow-up Suggestions

- ↳ What are the potential pathways through which microplastics may affect human health?
- ↳ How do microplastics interact with the human immune system?
- ↳ What are the long-term health implications of microplastic exposure in humans?

Ask a follow-up question

Add a column 2

Add paper(s)

1. Structurez les données probantes — Cliquez sur « Explore as a table » pour transformer les références sous-jacentes en un tableau comparatif : les articles cités deviennent des lignes et les données clés deviennent des colonnes.

2. Façonnez le tableau selon votre question — Ajoutez des colonnes, précisez les dimensions que vous souhaitez comparer ou effectuez une recherche dans les articles pour dégager les résultats les plus pertinents pour votre synthèse.

4. Explorer le panneau des détails de référence et vérifier les affirmations

The screenshot displays the LeapSpace interface. On the left, a panel titled 'Seaweed cultivation for protein and carbon capture' shows a summary table with three rows: 'Protein supply', 'Carbon capture', and 'Integrated systems & co-benefits'. Each row lists key mechanisms and evidence. An orange arrow points from the evidence column of the 'Protein supply' row to the 'Reference details' panel on the right. The 'Reference details' panel shows the source 'Scopus abstract Chapter', the title 'Protein from seaweed aquaculture', and a 'Trust Card' with a 'Neutral' rating. The 'Trust Card' text states: 'The reference discusses seaweed's high protein content (up to 47% dry weight) and notes developing extraction techniques (solvent, enzymatic, microbial) but does not address wastewater/process-water cultivation or biorefinery approaches. Thus, while the general topic of seaweed as an alternative protein source and improved recoverability is aligned, parts of the claim are not directly supported.'

Domain	Key mechanisms	Evidence
Protein supply	• Wastewater/process-water cultivation boosts protein content and yields. • Seaweed can reach high protein levels and serve as alternative proteins. • Biofertilizers and improved extraction increase protein recoverability.	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Carbon capture	• Very high primary productivity draws down CO ₂ . • Carbon exported as POC or RPOC becomes long-term storage. • Carbon sink estimates for cultivated systems are large (depending on fate of biomass).	6, 7, 8, 9, 10, 11, 12
Integrated systems & co-benefits	• IMTA systems recycle nutrients and enhance both biomass and carbon capture. • Wastewater-based cultivation removes N/P while producing protein-rich biomass.	13, 14, 15

Vérifiez les affirmations et explorez les sources — en cliquant sur un numéro de citation, vous ouvrez le panneau des détails de référence, qui affiche :

1. Les détails bibliographiques

2. L'option d'exporter la référence

3. **Trust Card** — Le passage « Link to statement » indique dans quelle mesure l'affirmation correspond à la source d'origine.

4. **Passages pertinents** — Le système met en évidence les passages du résumé ou du texte intégral qui ont servi à générer l'affirmation.

5. Valider les constats à l'échelle du paysage de la recherche

The image displays two side-by-side panels from the Claim Radar application. The left panel, titled 'Seaweed cultivation for protein and carbon capture', shows a 'Summary table' with three domains: 'Protein supply', 'Carbon capture', and 'Integrated systems & co-benefits'. Each domain lists key mechanisms and evidence. An orange arrow points from a red square in the 'Protein supply' evidence column to the right panel. The right panel, titled 'Claim Radar', shows a 'Processing steps' section with a red circle containing the number '1'. Below this, it displays an 'Identified claim' and a bar chart showing '25 related documents' with 17 support, 6 mixed, and 2 contradict. A 'Do you find Claim Radar helpful?' section is also visible.

Domain	Key mechanisms	Evidence
Protein supply	• Wastewater/process-water cultivation boosts protein content and yields. • Gossamer can reach high protein levels and serve as alternative proteins. • Biofertilizers and improved extraction increase protein recoverability.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Carbon capture	• Very high primary productivity draws down CO ₂ . • Carbon exported as POC or RDOC becomes long-term storage. • Carbon sink estimates for cultivated systems are large (depending on fate of biomass).	13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25
Integrated systems & co-benefits	• IMTA systems recycle nutrients and enhance both biomass and carbon capture. • Wastewater-based cultivation removes N/P while producing protein-rich biomass.	26, 27, 28, 29, 30, 31, 32, 33, 34, 35

1. Confrontez les affirmations à l'ensemble de la recherche — Claim Radar vérifie les constats générés par l'IA en les confrontant à l'ensemble du paysage de la recherche scientifique. En s'appuyant sur les Trust Cards, il analyse jusqu'à 40 des sources les plus pertinentes parmi plus de 100 millions d'articles indexés dans Scopus afin d'indiquer en temps réel si une affirmation est étayée, contredite ou nuancée. Les résultats s'accompagnent de synthèses visuelles claires et d'une traçabilité complète des sources et des données probantes utilisées.

6. Trouver des experts et des collaborateurs potentiels

Summary Table: Top Experts by Domain

Domain	Key Experts	Why They're Relevant	Citations
Seaweed Cultivation & Aquaculture	Ni P.D. Kusuma, Pieter Amalo, Rifqah Pratiwi, Adrian K. Macleod	Work on <i>Kappaphycus</i> and <i>Eucheuma</i> cultivation, growth optimization, and sustainable farm design	48 49 50 51
Seaweed Proteins & Extraction Technologies	Diane Purcell, João P. Trigo, Kristoffer Stedt, Jayani Samarathunga, Maria Hayes	Lead research on seaweed protein extraction, functional foods, biochemical profiling	52 53 54 55 56
Macroalgal Carbon Capture & Blue Carbon Modeling	Si Chen, Xiuting Feng, Ruimin Zhang, Ellen Ould, Bin Li	Produce high-impact work on DOC/POC pathways, carbon accounting frameworks, and macroalgal carbon fate	57 58 59 60 61

1. Experts in Seaweed Cultivation and Applied Aquaculture

Ni P.D. Kusuma

Focus on **Kappaphycus** and **Sargassum** cultivation performance, biochemical composition, and bioactivity [48](#).

Pieter Amalo

Ask a follow-up question



1



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Seaweed cultivation for protein and carbon capture

Experts in Seaweed Cultivation and Marine Protein

Leading Experts on Seaweed Cultivation, Seaweed-Based Protein, and Macroalgal Carbon Capture

Below is a structured synthesis of the most relevant experts identified from the retrieved author data. These individuals have **substantial publication output, citation impact, or specialized expertise** in seaweed cultivation, marine protein, macroalgal carbon sequestration, or carbon-cycle modeling.

Summary Table: Top Experts by Domain

Domain	Key Experts	Why They're Relevant	Citations
Seaweed Cultivation & Aquaculture	Ni P.D. Kusuma, Pieter Amalo, Rifqah Pratiwi, Adrian K. Macleod	Work on <i>Kappaphycus</i> and <i>Eucheuma</i> cultivation, growth optimization, and sustainable farm design	48 49 50 51
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Pieter Amalo

Ask a follow-up question

Author preview

Adrian K. Macleod 3

Matching documents	h-index	Citations
12	11	872

[View profile](#)

Matching documents

Production of acetone, butanol, and ethanol by fermentation of *Saccharina latissima*: Cultivation, enzymatic hydrolysis, inhibitor removal, and fermentation

Schulze-Jens, A. ; Vroon, R.C. ; Macleod, A.K.A. ; López-Contreras, A.M. ; Boon, M.A.

Algal Research 71 • Journal • 2022

32 citations

Ensilaging sugar kelp biomass for biorefining

Larsen, S.M. ; Ma, N. ; Hou, X. ; Bak, U.G. ; Siers, A.-S.

Biomass and Bioenergy 71 • Journal • 2021

11 citations

Is social license to operate relevant for seaweed cultivation in Europe?

Billing, S.L. ; Rostan, J. ; Tett, P. ; Macleod, A.

Aquaculture 71 • Journal • 2021

42 citations

Effects of seedling method, timing and site selection on the production and quality of sugar kelp, *Saccharina latissima*: A Danish case study

- Repérez les experts du domaine et les collaborateurs potentiels** — Une fois le Topic Overview généré, demandez à LeapSpace, avec « Ask a follow-up question », d'identifier les principaux experts du domaine ou de suggérer des collaborateurs potentiels.
- Consultez la liste des Active Contributors** — LeapSpace génère une liste des personnes qui travaillent activement sur votre sujet de recherche précis.
- Explorez les Expert Insights** — Vous pouvez consulter en détail le profil de chaque personne figurant dans la liste afin d'examiner son expérience, ses publications et ses travaux antérieurs. Ces informations proviennent de la base de données Scopus d'Elsevier.

7. Explorer les opportunités de financement

How can seaweed cultivation contribute to global protein supply while capturing carbon?

Copilot steps >

Seaweed cultivation for protein and carbon capture

How seaweed cultivation can boost global protein supply while capturing carbon

Seaweed cultivation contributes to **protein production** and **carbon capture** through well-documented mechanisms:

1. **High-protein biomass generation**, especially when nutrients are optimized.

2. **Substantial carbon fixation during growth**, with some portion stored long-term as particulate or dissolved organic carbon.

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Domain	Key mechanisms	Evidence
Protein supply	• Wastewater/process-water cultivation boosts protein content and yields. • Seaweed can reach high protein levels and serve as alternative protein. • Biorefineries and improved extraction increase protein recoverability.	1 , 2 , 3 , 4 , 5 ↗
Carbon capture	• Very high primary productivity draws down CO ₂ . • Carbon exported as POC or RDOC becomes long-term storage. • Carbon sink estimates for cultivated systems are large (depending on fate of biomass).	6 , 7 , 8 , 9 , 10 , 11 , 12 ↗
Integrated systems & co-benefits	• IMTA systems recycle nutrients and enhance both biomass and carbon capture. • Wastewater-based cultivation removes N/P while producing protein-rich biomass.	13 , 3 , 14 , 15 ↗

What funding opportunities exist in the U.S. for this topic?

1

Seaweed cultivation for protein and carbon capture

Funding opportunities for seaweed cultivation and carbon capture

U.S. Funding Opportunities Relevant to Seaweed Cultivation, Marine Protein, and Ocean-Based Carbon Capture

Below is a **focused synthesis** of the funding opportunities from your search that **meaningfully support** work on seaweed aquaculture, blue carbon, marine biomass, sustainable marine protein, or enabling technologies for carbon removal and aquaculture systems. Only opportunities with **direct or enabling relevance** are included.

Summary Table: Most Relevant Opportunities

Opportunity	Funder	Amount	Why It's Relevant	Citations
VentureWell Ocean Enterprise Accelerator	VentureWell	\$140,000	Supports ocean-data tech and innovations; strongest for MW, carbon accounting, seaweed farm monitoring	29 30 31
NIST: Water Quality & Health in Aquaculture	NIST	\$85,764	Directly supports aquaculture R&D including nutrient dynamics important to seaweed and IMTA	32 33
NOAA: Population Assessment Modeling for Marine Aquaculture	NOAA	Not listed	Supports ecological modeling for aquaculture; relevant for seaweed-ecosystem interactions	34
BARO Aquaculture & Desert Farming Program	BARO (US-Israeli)	\$600,000	Funds algae, seafood, and aquaculture protein research; requires US-Israeli partnership	41 42
NREL Seawater Carbon Capture & Hydrogen Production	U.S. Naval Research Lab	\$104,401	Strong thematic link to ocean carbon pathways; enabling carbon-capture tech	43
NOAA: Inter-Ocean	NOAA	Not listed	Supports foundational	35

Who are the experts on this topic?

Funding preview

Funding institutional

Funding opportunity

Measurement Science to Promote Water Quality and Health in Aquaculture

National Institute of Standards and Technology 21 USA

mary.bedner@nist.gov

Awarded amount

Type

\$85764 USD

Individual fellowships

[Apply for funding](#)

Summary

Eligibility details

NIST, in collaboration with the Institute of Marine and Environmental Technology (IMET), is seeking a post-doctoral scientist to participate in measurement science research to support the development of sustainable aquaculture in the US. The research will be accomplished through the complementary capabilities or both organizations including advanced analytical capabilities at NIST (e.g., LC-MS/MS and GC-MS) and a state-of-the-art aquaculture research center at IMET. Potential research areas of interest include the development of sensitive and selective methods for determining organic contaminants, such as hormones, metabolites, and feed by-products in recirculating aquaculture systems (RAS); evaluation of passive sampling devices for mimicking the bioaccumulation of targeted organic contaminants in RAS; study of antibiotics used as food supplements in aquaculture, particularly transport through the water, metabolic by-products, and development of novel treatment approaches; development of analytical capabilities for off-flavor detection in water and fish tissue, including the development and evaluation of novel technology for off-flavor removal; measurement approaches for understanding contaminant remediation by oysters and other filter feeders in marine aquaculture; and determination of the impact of current-use pesticides on

1. Renseignez-vous sur les financements disponibles — Pour savoir quels organismes financent la recherche dans ce domaine, utilisez la fonctionnalité « Ask a follow-up question ».

2. Consultez les Funding Sources — Vous pouvez afficher une liste des principaux organismes et sources de financement liés à ce domaine de recherche.

3. Identifiez des Funding Opportunities précises — Vous pouvez approfondir l’analyse des différentes possibilités de financement proposées par chaque organisme afin d’identifier celles susceptibles de soutenir vos propres travaux.

8. Créer un rapport de vos résultats

Experts in Seaweed Cultivation and Marine Protein

Leading Experts on Seaweed Cultivation, Seaweed-Based Protein, and Macroalgal Carbon Capture

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Focus on **Kappaphycus** and **Sargassum** cultivation performance, biochemical composition, and bioactivity [48](#).

Pieter Amalo

Can you make a short report for my team about this and include diagrams?

 1 

1. Experts in Seaweed Cultivation and Applied Aquaculture

N.P.D. Kusuma

Focus on **Kappaphycus** and **Sargassum** cultivation performance, biochemical composition, and bioactivity [ask](#)

Pieter Amsin

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Seaweed cultivation for protein and carbon capture

3. Diagram: Protein & Carbon Pathways in Seaweed Cultivation

```

graph TD
    Nutrients --> Growth
    Growth --> Biomass
    Biomass --> Protein
    Biomass --> Carbon_fixation[Carbon fixation]
    Protein --> POC_export[POC export]
    Carbon_fixation --> RDOC_formation[RDOC formation]
    POC_export --> Long_term_storage[Long term storage]
    RDOC_formation --> Long_term_storage
  
```

Figure 1: Seaweed nutrient uptake drives biomass formation, protein yield, and carbon pathways

Matching documents

Production of acetone, butanol, and ethanol by fermentation of *Saccharina latissima*: Cultivation, enzymatic hydrolysis, inhibitor removal, and fermentation
 Schultze-Jens, A. ; Vroon, B.C. ; Macleod, A.K.A. ; López-Contreras, A.M. ; Boon, M.A.
Algal Research 71 • Journal • 2022
 32 citations

Ensilage of sugar kelp biomass for biorefining
 Larsen, S.U. ; Ma, N. ; Hou, X. ; Bak, U.G. ; Bjørns, A.-B.
Biomass and Bioenergy 21 • Journal • 2021
 11 citations

Is social license to operate relevant for seaweed cultivation in Europe?
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Effects of seedling method, timing and site selection on the production and quality of sugar kelp, *Saccharina latissima*: A Danish case study
 Boderskov, T. ; Nielson, M.M. ; Rasmussen, M.B. ; Sloth, J.J. ; Bruhn, A.

2

1. Générez un rapport — Utilisez la fonctionnalité « Ask a follow-up question » pour créer un rapport permettant de partager les principaux résultats avec votre équipe.

2. Analysez le rapport — LeapSpace s'appuie sur les échanges précédents comme contexte afin de générer un rapport structuré incluant un diagramme. Les références associées aux étapes précédentes y sont également intégrées, regroupant ainsi l'ensemble des informations pertinentes dans un document unique.

9. Générer un rapport Deep Research

Discover *deeper* insights

Based on peer-reviewed abstracts and full text

Which seaweed species exhibit the highest protein yield under varying nutrient and light conditions, and what physiological or biochemical mechanisms regulate their carbon capture efficiency and amino acid synthesis?

Deep research

Explore topics Find experts Find funding

Seaweed species protein yield and mechanisms

Which seaweed species exhibit the highest protein yield under varying nutrient and light conditions, and what physiological or biochemical mechanisms regulate their carbon capture efficiency and amino acid synthesis?

Show deep research steps - Processed for 1m 57s

Deep research report View Deep research response as PDF

This report may contain inaccuracies. Please verify the information independently.

Protein Yield, Carbon Capture, and Amino Acid Synthesis in High-Protein Seaweeds: Species Comparisons and Environmental Regulation

Quick Reference

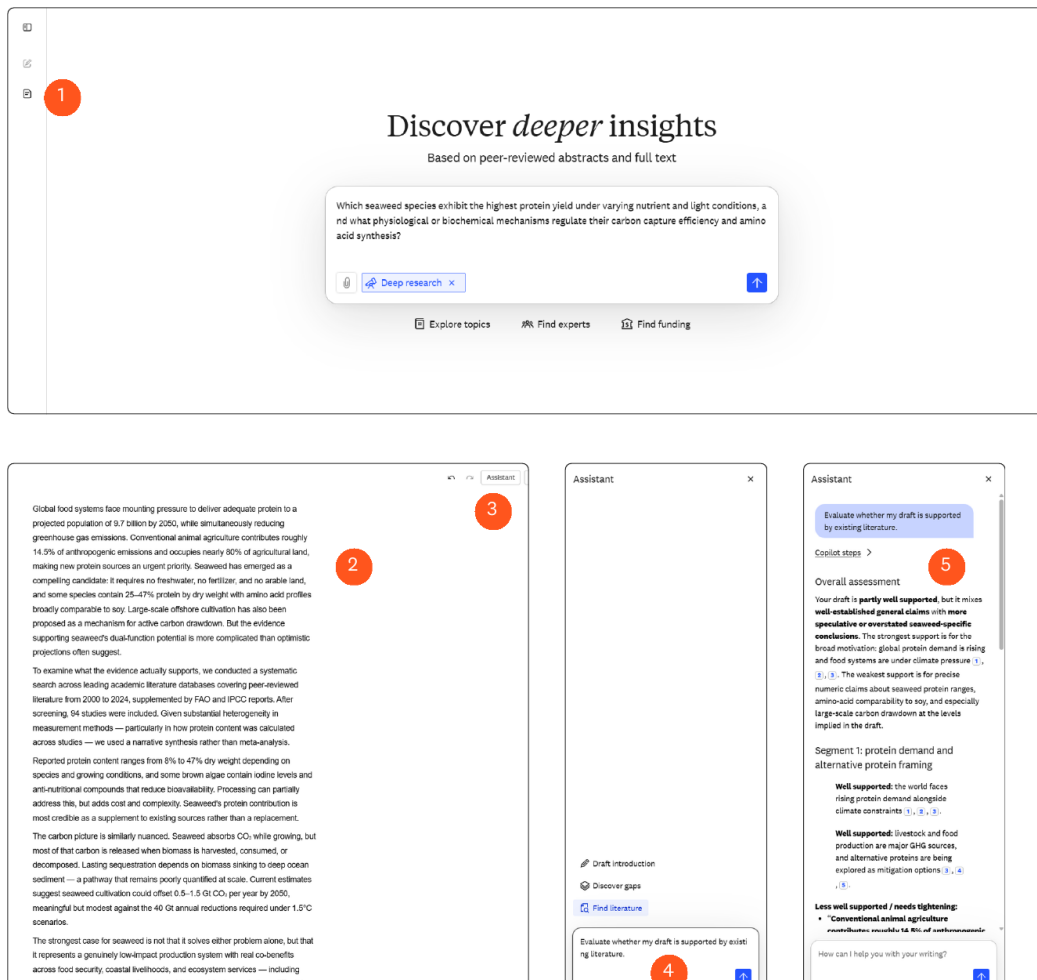
Key Findings Table

Species/Group	Max Protein Yield (% DW)	Optimal Conditions	Key Mechanisms for Carbon Capture & Amino Acid Synthesis	Notable References
<i>Ulva fasciata</i>	24.5	High nutrients, high light	Robust CCMs, boundary layer acidification, GS/GOGAT, PII/NAGK	1 2 3
<i>Ulva prolifera</i>	Highest in Ulva group	400 $\mu\text{mol m}^{-2} \text{s}^{-1}$, 26°C, High N	CCM flexibility, strong N assimilation, GS/GOGAT	4 5
<i>Porphyra/Pyrropia</i> spp.	30-47	Winter/spring, high nutrients	Efficient Rubisco, GS/GOGAT, PII/NAGK	6 7

1. Produisez un rapport complet et rigoureusement argumenté — Deep Research pousse votre exploration encore plus loin en générant, en quelques minutes, des rapports complets, structurés et solidement argumentés. Lorsqu’une question est posée, Deep Research va bien au-delà d’une simple synthèse des informations existantes : il élabore un plan de recherche détaillé, mène des recherches approfondies dans la littérature scientifique sélectionnée au sein de LeapSpace et affine progressivement son approche à mesure que de nouveaux insights émergent.

2. Analysez le Report Overview — Consultez rapidement un résumé structuré et entièrement référencé comprenant les principaux résultats, une réponse directe à la requête, le périmètre de l’étude, les hypothèses et limites, la synthèse et la discussion, les pistes de recherche futures, les conclusions ainsi qu’une sélection de lectures recommandées.

10. Rédiger avec Writing Coach



Writing Coach est un outil de rédaction conçu pour les chercheurs : un espace de travail conversationnel, sécurisé et confidentiel, pour structurer votre raisonnement, renforcer vos arguments et repérer les lacunes.

- 1. Ouvrez Writing Coach** — Accédez à Writing Coach depuis la page d'accueil de LeapSpace.
- 2. Ajoutez votre brouillon** — Saisissez ou collez votre brouillon dans l'éditeur de document.
- 3. Ouvrez le panneau Assistant** — Cliquez sur l'icône « Assistant » pour afficher un panneau de conversation à droite de l'écran.
- 4. Amorcez une conversation** — Par exemple, demandez de mettre vos données probantes en contexte par rapport à la littérature existante.
- 5. Renforcez et peaufinez votre texte** — Renforcez vos arguments et repérez les lacunes grâce à un dialogue itératif fondé sur des données probantes.

11. Peaufiner vos brouillons par le dialogue

Global food systems face mounting pressure to deliver adequate protein to a projected population of 9.7 billion by 2050, while simultaneously reducing greenhouse gas emissions. Conventional animal agriculture contributes roughly 30% of global greenhouse gas emissions.

Qualify projection: add support

Global food systems face mounting pressure to provide adequate protein for a growing global population by 2050 while reducing greenhouse gas emissions (Godfray et al. 2010), (Springer et al. 2018), (Lal et al. 2011).

✓ Keep ✗ Reject

To examine what the evidence actually supports, we conducted a systematic search across leading academic literature databases covering peer-reviewed literature from 2000 to 2024, supplemented by FAO and IPCC reports. After screening 84 studies were included. Given substantial heterogeneity in measurement methods — particularly in how protein content was calculated across studies — we used a narrative synthesis rather than meta-analysis. Reported protein content ranges from 8% to 47% dry weight depending on species and growing conditions, and some brown algae contain iodine levels and anti-nutritional compounds that reduce bioavailability. Processing can partially address this, but adds cost and complexity. Seaweed's protein contribution is most credible as a supplement to existing sources rather than a replacement. The carbon picture is similarly nuanced. Seaweed absorbs CO₂ while growing, but most of that carbon is released when biomass is harvested, consumed, or decomposed. Leading sequestration depends on biomass sinking to deep ocean sediment — a pathway that remains poorly quantified at scale. Current estimates suggest seaweed cultivation could offset 0.5–1.5 Gt CO₂ per year by 2050, meaningful but modest against the 40 Gt annual reductions required under 1.6°C scenarios. The strongest case for seaweed is not that it solves either problem alone, but that it represents a genuinely low-impact production system with real co-benefits across food security, coastal livelihoods, and ecosystem services — including water quality improvement and marine habitat provisioning — that are difficult to monetize but substantively real.

Assistant

Flag sentence level edits in my draft and include references

Copilot steps

These changes make the draft more credible by aligning the strength of each claim with what the literature actually supports, especially where the evidence is variable or uncertain. That matters because readers notice when precise numbers or climate claims sound firmer than the sources justify, and that can weaken trust in the whole argument. They also sharpen the distinction between seaweed's promise as a protein source and the much less settled case for durable carbon removal. The main thing to double-check is that each citation backs the exact wording and level of certainty you use, not just the general topic.

Writing changes

- Qualify projection: add support
- Hedge variable emissions claim
- Clarify carbon accounting boundary
- Strengthen uncertainty framing
- Remove unsupported numeric estimate

✗ Revert all ✓ Keep all

Review changes to continue editing your text

How can I help you with your writing?

1. Move between dialogue and edits — You can keep refining and shaping your draft as the conversation continues. For instance, by asking for sentence level edits and references, the tool understands you are requesting a change to the document and generates an inline suggestion — making it easy to move smoothly between discussion and structured writing.

2. You stay in control — Writing Coach does not change your work automatically. You decide what to keep or reject as you develop your draft.

References in this writing Find more references

- Hasselström, L. & Thomas, J.-B.E. (2022). A critical review of the life cycle climate impact in seaweed value chains to support carbon accounting and blue carbon financing. *Cleaner Environmental Systems*.
- Carvin, M.C. et al. (2025). Can the Emerging European Seaweed Industry Contribute to Climate Change Mitigation by Enhancing Carbon Sequestration?. *Reviews in Aquaculture*.
- Ye, G. et al. (2024). Seaweed sinking has great potential for climate mitigation in China. *Ecological Indicators*.

Remove reference

Unlink reference

Assistant

not firmly support. That matters because readers will trust the argument more when the level of certainty matches the evidence, especially on emissions shares, land use, and seaweed carbon removal, where estimates vary across sources. They also help the paper present seaweed as a promising but limited option rather than a settled solution, which is closer to the current review literature on protein potential, processing constraints, and uncertain sequestration pathways. The main thing to double-check is that every quantitative statement now has a source that supports that exact figure, not just the

Unused references

- Hasselström, L. & Thomas, J.-B.E. (2022). A critical review of the life cycle climate impact in seaweed value chains to support carbon accounting and blue carbon financing. *Cleaner Environmental Systems*.
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Assistant

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How can I help you with your writing?

References in this writing

[Find more references](#)

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How can I help you with your writing?

3. **Manage references inline** — You can see any added references listed at the bottom of your draft and you can always choose to remove or unlink a reference if it is no longer relevant.
4. **Full traceability** — Removed references remain listed below for full traceability.

1. Passez du dialogue aux modifications — Vous pouvez continuer à peaufiner et à façonner votre brouillon au fil de la conversation. Par exemple, en demandant des modifications au niveau des phrases et des références, l'outil comprend que vous souhaitez modifier le document et propose une suggestion intégrée directement dans le texte — ce qui permet de passer aisément de la discussion à la rédaction structurée.

2. Gardez le contrôle — Writing Coach ne modifie jamais votre texte automatiquement. C'est vous qui décidez quoi garder ou rejeter au fil de la rédaction.

3. Gérez les références directement dans le texte — Les références ajoutées apparaissent au bas de votre brouillon; vous pouvez à tout moment retirer ou dissocier une référence qui n'est plus pertinente.

4. Assurez une traçabilité complète — Les références retirées demeurent visibles plus bas, pour une traçabilité complète.

12. Vérifier les affirmations de votre brouillon

The image shows a software interface for verifying claims. It consists of three main panels:

- Top Panel:** A draft text about seaweed as a protein source. A red circle with the number '1' is placed over the 'Claim radar' button in the top right corner.
- Bottom Left Panel (Claim Radar):** A panel titled 'Claim Radar' with a red circle with the number '2' over the 'Update claims' button. It lists several claims extracted from the draft, such as 'Conventional animal agriculture contributes roughly 14.5% of anthropogenic emissions and occupies nearly 80% of agricultural land.'
- Bottom Right Panel (Claim Evidence):** A panel titled 'Claim evidence' with a red circle with the number '3' over the 'Processing steps' button. It shows the selected claim, a bar chart of '46 related documents' (31 Support, 14 Mixed, 1 Contradict), and '4 key insights'.
- Right Panel (Assistant):** A panel titled 'Assistant' providing context and suggestions for the draft text.

1. **Surface claims from your draft** — Clicking on the Claim Radar icon opens a panel listing the claims pulled from your draft.
2. **Check claims against the literature** — Claim Radar shows whether a claim is supported or contested in the wider literature.
3. **Evidence-based validation** — Selecting a claim searches up to 40 relevant sources across 100M+ Scopus-indexed papers, showing whether evidence supports, contradicts, or presents mixed findings, with a clear evidence trail.

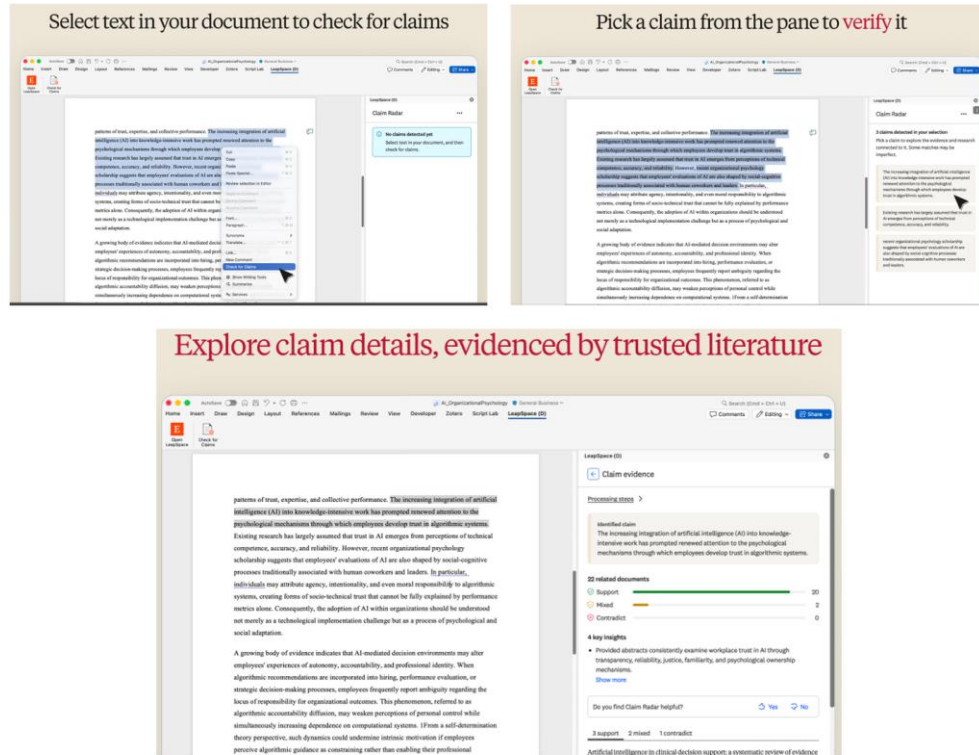
1. Repérez les affirmations de votre brouillon — En cliquant sur l'icône Claim Radar, vous ouvrez un panneau qui liste les affirmations tirées de votre brouillon.

2. Confrontez les affirmations à la littérature — Claim Radar indique si une affirmation est appuyée ou contestée dans la littérature scientifique au sens large.

3. Validez à partir de données probantes — En sélectionnant une affirmation, l'outil interroge jusqu'à 40 sources pertinentes parmi plus de 100 millions d'articles indexés dans Scopus pour indiquer si les données probantes appuient, contredisent ou nuancent l'affirmation, avec une traçabilité claire.

13. Vérifier les affirmations dans Microsoft Word

Nouveauté — Le complément LeapSpace pour Word permet de vérifier les affirmations directement dans votre document.



Utiliser le complément dans Word

- 1. Surlignez un passage de texte** — Sélectionnez une portion de texte dans votre document Word.
- 2. Ouvrez la commande** — Faites un clic droit sur le passage surligné, puis choisissez « Check for Claims ».
- 3. Utilisez le ruban** — Vous pouvez aussi choisir « Check for Claims » sous l'onglet LeapSpace dans le ruban.
- 4. Affichez les affirmations** — Claim Radar s'ouvre, extrait les affirmations du passage sélectionné et les affiche dans le volet LeapSpace.
- 5. Examinez les données probantes** — Choisissez une affirmation pour la vérifier à l'aide de la littérature. Le complément l'analyse et présente les données probantes. Les sources sont classées selon qu'elles appuient l'affirmation, la contredisent ou présentent des résultats mitigés, avec les principaux constats à l'appui.

Le complément est offert gratuitement aux établissements et aux personnes abonnées à LeapSpace. Pour en savoir plus sur le déploiement consultez la documentation Microsoft : guide de déploiement Microsoft: <https://learn.microsoft.com/fr-fr/microsoft-365-apps/deploy/deployment-guide-microsoft-365-apps>