CV

Dr Pau Juan-García

Research Scientist
Water Management Consultancy

Profile

Pau is a Doctor in Water Science and Technology and has over 8 years of experience in the water and environment sector. His background is in environmental science with a Masters' in environmental engineering. He has been in the scientific committee of various international conferences and authored several peer reviewed publications. Currently he is a Senior Consultant in the Strategic Advisory Services (SAS) Research team in the Water Management Consultancy group at Atkins UK. His areas of expertise include water quality and wastewater process modelling, resilience, data analysis, GIS and programming. He is particularly interested in operations research to support decision making in water management. Pau has acted as the Project Information Manager for various projects in Atkins, including CIP3 where he was in charge of data storage, cleaning, processing and analysis.

Key experience

- Researcher in water science and technology
- Water Quality modelling
- Wastewater process engineering (modelling and optimization)
- Data analysis
- Software development (Python, C#, R, Julia, MATLAB)
- Optimisation modelling (linear programming & optimisation)
- Resilience of water and wastewater treatment systems
- Geospatial analysis

Profession

Research Scientist

Joined Atkins

05/05/2015

Nationality / Languages

Spanish / Spanish, English, French, Catalan

Qualifications

BSc Environmental Science (University of Valencia)

MSc Environmental Engineering (Polytechnic University of Valencia)

PhD Water Science and Technology (Cum Laude) – Marie Curie

Professional associations

MMCC alumni

Member of the IWA ICA Specialist Group management committee

Experience with Atkins (May 2015 – Present)

2022 Welsh Water SAGIS modelling upgrade (project manager): Project manager in a water quality review of the SAGIS models for the River Tywi, Eden, Gwyrfai and Meirionnydd Oakwoods.

2022 SIMCAT scoping (technical specialist): Technical expert in a project to identify and appraise potential options for the ongoing management of the SIMCAT codebase, I carried out a desk-based study of open-source management practices, and a comparison of approaches adopted for other relatable software tools.

2022 EA EDF model calibration (technical specialist): Technical expert in charge of developing and automating a statistical method to identify sampling trends using the CUSUM data analysis technique. The trend analysis was used to filter datasets on river quality for various determinands prior to their use to update a water quality model.

2021-2022 Environment Agency – Coastal modelling (technical specialist)**:** This project for the Environment Agency consists of a series of modelling studies for the Taw-Torridge, Penzance and Bude areas, using the "State of the nation" methodology coined by the Environment Agency. My role consisted of

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designing the implementation of said methodology using Python, MIKE21, SWAN, XBeach and other modelling tools.

2021-2022 Wessex water modelling support for rCSMG (water quality modeller): Water quality modeller in study of phosphorus sources to identify the discharge permit criteria required to address DCWW's estimated 'fair share'. Key tasks include updating, designing scenarios for and calibrating the Wessex Water's water quality models. Other tasks include supporting Wessex Water in the undertaking of further simulation work.

2021-2022, UKWIR, Pollution Inventory Tool (Project manager and technical specialist): The objectives of this project were threefold: i) to provide an updated and revised version of the Pollution Inventory estimator tool to generate e-PRTR estimates of suitable credibility to regulators; ii) to demonstrate that the companies are using the best available information to support the requirements of regulators, and that this is provided on a consistent and comparable basis across the sector; and iii) to scope alternative platforms for the tool in future.

2021, Thames Water, Chalgrove STW (water quality modeller): Preparation of the solution development to Thames Water's Stage Gate 1 Approval AMP 7 Non-Infrastructure (NI) Project Brief for the wastewater treatment works following the completion of a site visit and options appraisal. The Chalgrove STW serves the village of Chalgrove with approximately 3,010 population equivalent (PE). This is set to increase due to significant growth in the catchment following the addition of 3,000 new properties in the development of land at Chalgrove Airfield. A study is required to assess the requirements for the upgrade of the Works to manage the anticipated growth and to ensure the Water Framework Directive (WFD) requirements do not cause deterioration or prevent future improvement works to the Haseley Brook. The study will also include a desktop environmental study to inform whether the existing watercourse could accommodate the proposed increase in effluent and identify likely associated risks.

2021, Thames Water, SESRO (data engineer, modeller): Use of SAGIS-SIMCAT to undertake modelling for the planned South East Strategic Reservoir Option (SESRO) in Oxfordshire. The purpose of the SAGIS modelling is to assess the impact of the scheme on WFD compliance in the River Thames and risks to drinking water at downstream water treatment works. Outputs would be used as part of the Gate 1 submission due March 2021.The outputs of the SAGIS modelling will also help define the requirements for further, more detailed work. Detailed hydrodynamic water quality modelling work for SESRO is currently being scoped for the period up to Gate 1 (model development) and then between Gate 1 and Gate 2. These would involve the use more specialised models such as MIKE21, MIKE 11 or PROTECH.

2021, UKWIR, Fair Share (project manager and technical specialist): The aim of this project is to provide the water industry with the capability to rapidly undertake pollution allocation evaluations using SAGIS outputs. The objectives of the project are to: i) Review sector allocation methodologies reported to date; ii) Provide a range of useful and informative catchment-based statistics at different spatial scales to enable better interpretation of catchment information and model outputs; iii) Create and demonstrate an analysis tool that can rapidly evaluate the implications of different interpretations (or variations) of the Polluter Pays methodologies, at a variety of spatial scales, and for a range of determinands; iv) Coordinate with the Project Steering Group (PSG) to identify the Polluter Pays methodology to be implemented in the final version of the new tool; v) Support the transfer of knowledge from the study to the wider SAGIS user community.

2021, UKWIR, SAGIS Support contract (lead software developer, modeller): Software developer in the maintenance and support of the SAGIS water quality simulation tool.

The Source Apportionment Geographical Information System (SAGIS) is a versatile digital information management and visualisation platform embedded within ArcGIS. In combination with the SIMCAT and MPER water quality models, SAGIS is used by Water Companies to support decision making as part of the Asset Management Planning (AMP) cycle process, and by Regulators for River Basin Management Planning. In the recent round of business planning for PR19, SAGIS-SIMCAT outputs have served as a key evidence base for identifying wastewater treatment works requiring schemes to further control discharge quality. The primary benefit SAGIS-SIMCAT provides is to help ensure that the Water Industry does not target capital and carbon intensive treatment solutions to address pollution arising from other sources or sectors. It therefore helps achieve an equitable split in investment between sectors, rather than loading the

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costs principally onto the water industry. SAGIS-SIMCAT is now firmly established within the Water Industry's 'business-as-usual' planning practices.

This support contract includes the development of new tools and functionality, as well as independent pieces of work such as creating a layer of targets and orthophosphate standards, and the development of scripts and data analysis to support SAGIS work.

2021 UKWIR, Chemical Investigation Programme (data analyst): Data analyst of water quality data samples across all water companies through Great Britain. The UKWIR Chemical Investigations Programme (CIP) is an ongoing research programme that addresses the likely implications of environmental legislation for the UK water industry. It has primarily been addressing the consequences of legislation relating to trace substances in the water environment. It is coordinated by UK Water Industry Research as a collaborative programme involving the ten water companies in England and Wales.

2020-2021, EA AMR (geospatial data analyst): This project is a step towards the development of an understanding of the hazard characterisation of AMR in the environment. The overarching aim of the work is to bring together various datasets about potential sources of AMR in the environment into one database, as an easy-to-access resource. Furthermore, the aim is that the database is in an easily expandable format, which allows the inclusion of new data as and when available. Relevant AMR datasets have been identified within a recent EA/Defra report 'Framework for understanding environmental antimicrobial resistance in England'. For the current project, the project team has located and compiled selected key datasets from this earlier report into four main geodatabases. These data will be a foundation of further efforts on AMR.

2020 Anglian Water CSMG Investigations (water quality modeller): Modeller in study to enable and design measures to help achieve CSMG targets and favourable status in the long term. The investigations follow a Judicial River and Consent Order that requires that the Environment Agency and Natural England to assess Natura 2000 sites and identify the measures necessary to achieve protected area objectives.

2020 SAGIS Climate change tool (technical specialist): Developing of a climate change and sensitivity analysis tool that will enable water companies and regulators to explicitly include climate change considerations in SAGIS-SIMCAT catchment and asset management planning applications. Key tasks include identifying the parameters to which SAGIS model outputs are most sensitive (independent of climate change).

2020-2021 Wessex water modelling support for PR24 (water quality modeller): Water quality modeller in study of phosphorus sources to identify the discharge permit criteria required to address DCWW's estimated 'fair share'. Key tasks include updating, designing scenarios for and calibrating the Wessex Water's water quality models. Other tasks include supporting Wessex Water in the undertaking of further simulation work.

2020 CDF-SW - DCS modelling - Taw Torridge (technical specialist): Project for Environment Agency in the South West. Developing in-house ability to carry out the "State of the Nation" methodology for Coastal Modelling. This consists of a series of Python scripts that automate wave simulations in SWAN and MIKE21, as well as curve fitting to extrapolate simulation results to similar areas.

2019-2020 Clwyd SAGIS catchment investigation (water quality modeller): The objective of this study was to apply a scenario modelling approach using the SAGIS-SIMCAT system to simulate the extent to which controls of phosphorous inputs from DCWW's assets might mitigate the risk of non-compliance within the Clwyd catchment and address DCWW's 'fair share'.

2019-2020 Upgrade of SAGIS Model Code (software developer): Software developer to migrate the SAGIS codebase to Python in ArcGIS Pro. SAGIS was 'written' in VBA, which has ceased to be available in future versions of ArcGIS. This project created the new ESRI Add-In to install SAGIS.

2018-2020 Extending and updating UKWIR's source apportionment tool; UKWIR, SEPA and Environment Agency (water quality modeller): Stage 1: Technical specialist responsible for the initial data analysis and appraisal of the update of the SAGIS-SIMCAT model to include faecal matter indicator organism (FIO) as a determinand. Stage 2: Assess the capability of using SAGIS for FIO mitigation and decision making with the inclusion of diffuse sources from livestock.

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2018 Enhancing the Scottish SAGIS modelling platform, UKWIR and SEPA (water quality modeller): Technical specialist to assist in the inclusion of lakes/lochs and reservoirs into SEPA's SAGIS models so that this offers an integrated catchment planning system.

2018 Extending and Updating UKWIR's SAGIS-SIMCAT decision support tool (software developer): Main software developer in project to expand the tool to include diffuse sources of pollution. The DST is an optimisation tool for water management built on top of the water quality modelling system SAGIS-SIMCAT.

2018 Extending and Updating UKWIR's source apportionment toolset (technical specialist): Technical specialist assisting on the deployment of a SAGIS-SIMCAT data analysis tool, consisting of an analytical methodology for detecting systematic bias and quantifying uncertainty in SAGIS input data. In charge of developing said methodology in a Python modelling platform.

2018 Climate Change Adaptation and Resilient Cities: A Streamlined Approach for the Assessment of the Contribution to Climate Action for Multi-Sector Framework Loans (data analyst): Technical specialist to provide support on the data analysis of the European Investment Bank (EIB) Framework loan dataset. Analysis included identification of trends and production of summary statistics and a range of charts, figures and complex visualisations.

2015-2018 Resilience of wastewater treatment to stress conditions. Marie Curie PhD grant (researcher): Researcher and PhD candidate of TreatRec, a Marie Sklodowska Curie Action European Industrial Doctorate program. The project arises from the collaboration between Academia (University of Girona, ICRA) and Industry (Atkins). The outputs include various publications, a review of resilience theory applied to wastewater treatment and a framework for model-based resilience assessment and energy audit of WWTW using the state of the art in process modelling.

Publications and conference proceedings

Peer reviewed journals

- Juan-García, P., Rieger, L., Darch, G., Schraa, O., & Corominas, L. (2021). A framework for model-based assessment of resilience in water resource recovery facilities against power outage. Water Research, 202. https://doi.org/10.1016/j.watres.2021.117459
- Regmi, P., Stewart, H., Amerlinck, Y., Arnell, M., García, P.J., Johnson, B., Maere, T., Miletić, I., Miller, M., Rieger, L., Samstag, R., Santoro, D., Schraa, O., Snowling, S., Takács, I., Torfs, E., van Loosdrecht, M.C.M., Vanrolleghem, P.A., Villez, K., Volcke, E.I.P., Weijers, S., Grau, P., Jimenez, J., Rosso, D., (2019). The future of WRRF modelling – outlook and challenges. Water Sci. Technol. 79, 3–14. https://doi.org/10.2166/wst.2018.498
- Juan-García, P., Kiser, M. A., Schraa, O., Rieger, L., & Corominas, L. (2018). Dynamic air supply models add realism to the evaluation of control strategies in water resource recovery facilities. Water Science and Technology, 78(5), 1104–1114. https://doi.org/10.2166/wst.2018.356
- Juan-García, P., Butler, D., Comas, J., Darch, G., Sweetapple, C., Thornton, A., & Corominas, L. (2017). Resilience theory incorporated into urban wastewater systems management. State of the art. Water Research, 115, 149–161. https://doi.org/10.1016/j.watres.2017.02.047

Peer reviewed conferences

- Tamara Fernández-Arévalo et al. (2018). "Experiences in the application of mathematical models in full scale WWTPs: the modelling from the perspective of applied research". In: Proceedings of the 6th IWA international conference on Water Resource Recovery Modelling. Quebec, Canada
- P. Juan-García, Mehlika A Kiser, et al. (2017). "Exploring the potential of dynamic air supply models to evaluate control strategies: the experience at the Girona WRRF". in: Instrumentation, Control and Automation 2017. Quebec, pp. 303–316