
Postdoctoral Research Fellowship

Kelp Loss, Dispersal and Blue Carbon

Extreme Coastal Ocean Events in South Africa

Host: Department of Biodiversity and Conservation Biology, University of the Western Cape (UWC)

Funding: NRF Earth System Science Research Programme (ECOE; ESS240501216867)

The opportunity

Applications are invited for a postdoctoral research fellowship to investigate how extreme coastal ocean events affect the loss, transport and fate of South African kelp. Climate change is intensifying marine heatwaves and other extreme events, while unusually severe swell and wave events can dislodge kelp from reefs. Together, these processes affect both the amount of kelp available for transport and its redistribution by ocean currents.

The fellow will develop a spatially explicit, event-based modelling framework to determine whether dislodged kelp is exported offshore, retained nearshore, stranded on beaches or transported to environments where it may contribute to long-term carbon storage. The work will connect physical oceanography, kelp forest ecology and blue-carbon science, and will contribute to understanding the ecological consequences of extreme coastal ocean events.

Research focus

The project will use Lagrangian particle tracking, preferably the [OceanParcels/Parcels](#) framework, together with ocean-current, wind and wave products. The fellow will:

- identify extreme-event and comparison periods, including marine heatwaves and severe storm, swell or wave events;
- simulate kelp transport under event and non-event conditions using currents, Stokes drift and appropriate object-specific behaviour;
- incorporate biologically meaningful parameters such as morphology, buoyancy, drag, sinking and floating persistence;
- quantify and map offshore export, nearshore retention, beaching and potential deep-ocean transport;
- evaluate sensitivity to release location, season, event type and biological assumptions; and
- where suitable data exist, compare modelled outcomes with remote sensing, beach-cast kelp records or other observations.

Eligibility and experience

Applicants must hold a PhD in physical oceanography, marine science, oceanography, marine ecology, applied mathematics, environmental modelling or a closely related field. The PhD must meet the eligibility requirements of the NRF and UWC postdoctoral fellowship rules in force at the time of appointment.

Essential experience:

- Lagrangian particle-tracking or closely related ocean-transport modelling;
- scientific programming, preferably in Python;
- working with gridded oceanographic data, including currents and one or more of wind, waves, Stokes drift, temperature or salinity;
- handling large multidimensional datasets and model outputs;
- quantitative analysis, mapping and scientific visualisation; and
- a record of relevant peer-reviewed research and clear scientific writing.

Desirable experience:

- OceanParcels/Parcels and Copernicus Marine or comparable products;
- custom particle behaviour, including drag, buoyancy, sinking, windage, land interaction or beaching;
- sensitivity experiments, hindcast analysis and model validation;
- extreme-event detection or analysis, particularly marine heatwaves, storms, swell or wave extremes;
- remote sensing of coastal or marine systems; and
- kelp ecology, blue carbon, the Benguela Upwelling System or South African coastal oceanography.

Expected outcomes

Expected outputs include a reproducible modelling workflow; event-based maps and estimates of kelp fate; a technical synthesis of how extreme events alter kelp transport and blue-carbon pathways; and at least one manuscript for an international peer-reviewed journal. The fellow will work collaboratively and will be expected to document code and data workflows so that the framework can be extended to other events, locations or kelp species.

Fellowship and application

Duration: Two years

Value: TBD

The award and appointment are subject to the applicable NRF and UWC eligibility, funding and administrative requirements.

Applicants should submit the following as a **single PDF**:

- a current curriculum vitae;
- the names and contact details of three referees;
- a list of publications relevant to the study topic, with work on Lagrangian models clearly identified; and
- a one-page synopsis of the proposed study plan, explaining the research questions, modelling approach, required data, validation strategy and anticipated outputs.

Send applications and enquiries to Prof. Albertus J. Smit at ajsmit@uwc.ac.za, with the subject line *Postdoctoral Fellowship: Kelp Dispersal and Blue Carbon*.

Closing date: 7 August 2026

The University reserves the right not to make an appointment.