



Research on pearl oyster aquaculture in French Polynesia

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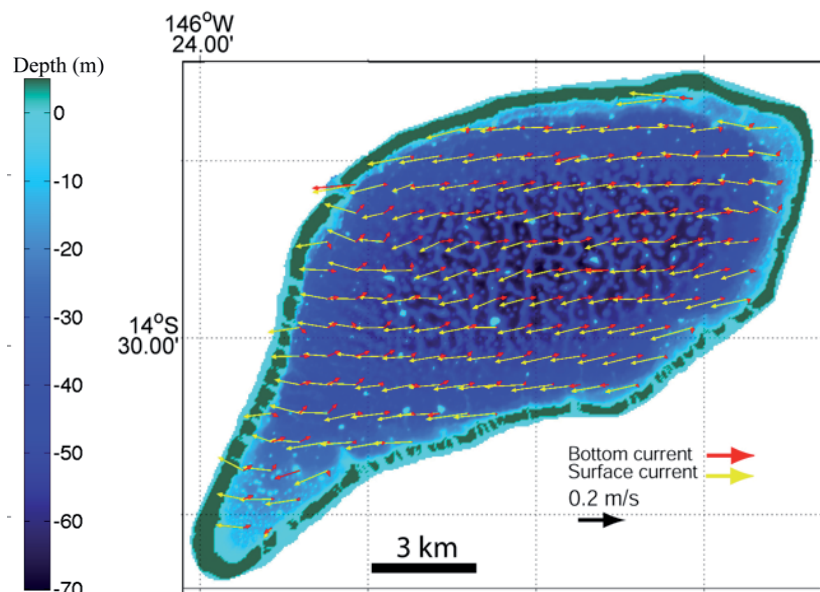
Between 2007 and 2010, the 9th European Development Fund (EDF) sponsored a large development plan in French Polynesia, called “Professionalisation and sustainability of pearl culture”. Spearheaded by the Service de la Perliculture (PRL, French Polynesia’s Pearl Oyster Aquaculture Service), which is based in Papeete, Tahiti, the project aimed to enhance the technical knowledge of *Pinctada margaritifera* pearl oyster farmers as well as their small-business economic management skills, and promoted innovative research by building on a number of previous research programmes that took place in the Tuamotu Archipelago after the 1980s.

A large training programme took place on all of the atolls that have aquaculture activities. Ahe and Takaroa atolls, two semi-closed atolls in the western Tuamotus, were selected as pilot sites for research.

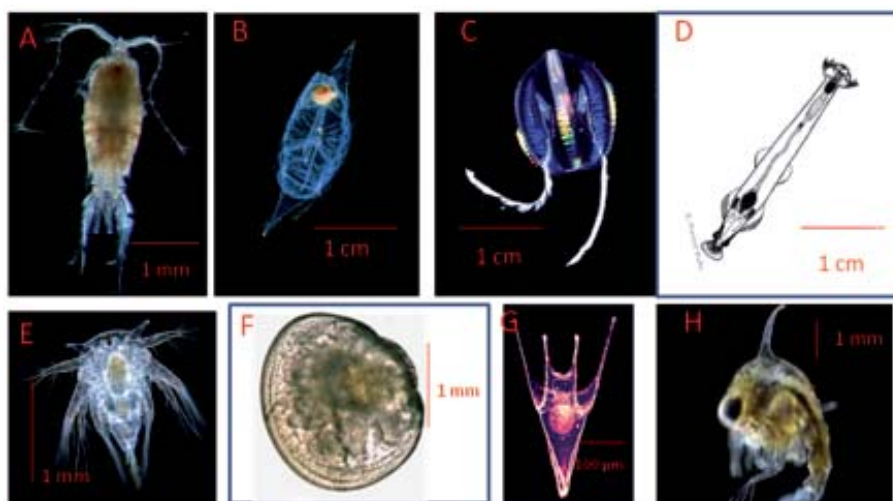
Research included four components:

1. A physical component aimed at studying the climatic regime of the western Tuamotus, and the hydrodynamic functioning of the lagoons. This included the use of various numerical models, remote sensing, and *in situ* measurement data. In particular, lagoon bathymetry was surveyed with acoustic technology, wave climate was studied at high resolution (5 km), and a three-dimensional model of lagoon circulation was created at 100 m-resolution. Field work provided one year of data to calibrate and/or validate the three-dimensional model, which required tide, wave, wind and current data measured in various atoll areas (forereef, pass, *hoa*, lagoon).
2. The biophysical modelling component took advantage of a large number of biological studies conducted on Ahe, several of which were initiated before the EDF project, and funded by other sources. In particular, larval concentrations, dispersal and collecting were studied *in situ* at different spatial and time scales during the previous two years, which provided invaluable data to validate the model.

A view of Ahe Atoll, showing the atoll’s bathymetry and a representation of surface and bottom currents during typical tradewind conditions. Courtesy of Romain Le Gendre (IRD/Ifremer).



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Examples of metazooplankton organisms, trophic competitors of the pearl oyster *Pinctada margaritifera* in atoll waters. Holoplankton: A) copepods (*Rhincalanus* sp.), B) salpe (*Salpa fusiformis*), C) *Pleurobrachia pilaeus* D) Chaetognathes (*Sagitta* sp.). Bottom meroplankton (larvae): E) balane, F) bivalve larvae, G) urchin larvae, H) crab larvae. Courtesy of Marc Pagano (IRD, UMR 213 LOPB).

- The project also funded the characterisation of different *Pinctada margaritifera* pearl oyster food sources and the spatio-temporal variability. Thus, the planktonic food web, biomass, production and community structure of the different compartments (phyto- and zooplankton) were studied during five campaigns, including for the first time a focus on viral communities and their influence on bacterial mortality. Meta-zooplankton communities, which are pearl oyster trophic competitors and predators of the larval stage, were also studied. Eventually, the impact of aquaculture activities on the food chain and lagoon carrying capacity could be estimated.
- Finally, spawning and growth of pearl oysters was studied *in vivo* and *in vitro* on Ahe in order to identify triggering signals and limitations found in different environmental and trophic conditions. These studies have provided the foundation to establish an initial Dynamic Energy Budget for pearl oyster.

All of these activities were conducted by a large group of scientists from local, national and international institutions (see acknowledgments). In November 2010, farmers were invited to attend one day of presentations in Papeete where all useful practical outcomes were presented and discussed.

A special issue of the journal *Marine Pollution Bulletin* (edited by Serge Andréfouët and Loïc Charpy) is currently being compiled, and includes scientific results in the form of a dozen papers. In addition, the French Research

Institute for Development (IRD) is reviewing documents that present the main concepts, results and practical recommendations by the scientific teams. These will appear in the form of 40, 2–3 page fact sheets, each focussing on different scientific aspects. These fact sheets are written for the layman and are intended to bring scientific knowledge to farmers. PRL, through its *Te Reko Parau* newsletter, is also disseminating results to farmers. These documents are currently only available in French.

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Under the main donor logo (European Union) and the logo of the Pearl Oyster Aquaculture Service, the logos of the various participating institutions that contributed to the project are seen here. The project benefited from other funding sources, including the Contrat État-Territoire funding scheme, and the Délégation à la Recherche de Polynésie française (to IFREMER).