

South Pacific



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P.1 20 years of Polynesia Mana

A discussion with Yannick Chancerelle

P.2 International Workshop in the South Pacific

Taxonomy and Survey of
corals in Fiji Islands

P.2 Local Workshops in French Polynesia

Shark-Human relationship
Taxonomic trainings

P.3 IRCP grants for Master, PhD and post-doctorate students

P.4 Coral reefs monitoring in the South Pacific

Marquesas Island

The Institute for Pacific Coral Reefs (IRCP) is a French institute of the Practical School of High Studies (EPHE), created on January 21st, 2009 by order of the French Ministry of Higher Education and Research. To achieve its objectives, IRCP has strong links with the Insular Research Center and Environment Observatory at Moorea Island, French Polynesia (CRIODE-USR 3278 CNRS-EPHE-UPVD).

IRCP Objectives:

- > Promote, over time, and at a regional scale for the South Pacific, the necessary link between fundamental research and the politics of conservation by ensuring sufficient training of those in coral reefs management and conservation;
- > Support research efforts that take account of the contribution of the human and social sciences to the sustainable management of coral reefs;
- > Set up a coral reef monitoring network in the South Pacific;
- > Work in favor of projects that aim to conserve coral reefs and contribute, in the context of sustainable development, to the future of the coral ecosystems and people who depend on them.



Polynesia Mana
20 years of surveys! A discussion with
Yannick Chancerelle, EPHE engineer at the CRIODE since 1992

Hello Yannick, can you introduce readers to the Polynesia Mana monitoring program?

Yannick: As of 1992, the CRIODE has been regularly monitoring the coral reefs of 15 islands; 10 that are in French Polynesia and 5 in nearby countries of the South Pacific (Kiribati, Rarotonga, Samoa, Tongatapu and Pitcairn). We call the monitoring program "Polynesia Mana". Our monitoring includes surveys of the benthic coral reef and coral reef fish and reef-associated fish communities. We have three survey sites around Tahiti and another three around Moorea; there is one survey site at each of the other islands (see map on page 4). At all survey sites, the surveys are conducted on the upper reef slope, homogeneous environments ensuring we can compare survey results within and among islands over time.

Can you tell us how you chose islands and survey methods?

For the first 15 years our monitoring locations were decided based on the missions of the various current research projects being managed by the CRIODE. Under the direction of Dr. Serge Planes the program was refined and the 15 islands and their survey locations were settled, which included the additions of the islands from neighboring countries in the South Pacific. Currently, each island is visited for surveys one time every 2 years.

Concerning our survey methods, we survey quadrats and photographic landscapes, and undertake a Manta tow survey. We have recently added high frequency temperature measurements at every survey site as well as other instrumentation for recording environmental conditions at the international survey sites as well as in Tubuai, Moorea and in the Marquesas islands.

Who are the scientists that participate in the Polynesia Mana monitoring with you?

In the very beginning, I worked alone with occasional dive buddy helpers. From 2004-2012, Thierry Lison de Loma completed our fish surveys. Most recently, Gilles Siu has been traveling with me into the field to assist with fish surveys.

Data have collected for 20 years now: what do you think are the most interesting results?

We have found great variation through time in the community composition of coral community. Coral bleaching events, tropical cyclones and outbreaks of crown-of-thorns starfish (COTS) have all affected both the composition and condition of the organisms living on the reef substrate. Some areas have been far less affected by disturbances than others. For example, Marutea/Nengo has been cooler during warm years so has not been impacted as severely as other locations by coral bleaching. Similarly, COTS have been observed, sometimes in high densities, near all of the high volcanic islands of the Society archipelagos. But they have never been observed at Tuamotu remote low-lying atolls and associated reefs such as the Marquesas Islands. The coral communities around the islands of Moorea and Tahiti have been disturbed especially frequently having suffered a COTS outbreak from 2004 to 2010, a bleaching event in 2007 and a tropical cyclone in 2010. Coral cover on the upper reef slopes of Moorea and Tahiti declined from 50 to <1%. Researchers from the CRIODE thought it may take the coral cover a decade or longer to recover. However, as of now, only 4 years after tropical cyclone Oli, roughly 20% of the upper slope is covered with coral.

What projects does the Polynesia Mana monitoring team have planned for the future?

The long-term strategy is to involve people from each of the countries where we undertake our surveys. We want to share our methods and our knowledge so that people in these countries can continue the surveys on their own. In the near future, we want to expand the types of environmental data that we collect at each of the survey sites to include using more sophisticated instrumentation. The instruments we are planning to install at our survey sites will collect real time data for pH, dissolved oxygen, temperature, turbidity and salinity. We are testing the type of instrument we want to use at Tiahura Reef, on the north coast of Moorea. Soon, we will place one of these instruments at our survey site in the Marquesas Islands.

Action 1: International Workshop in the South Pacific



THE UNIVERSITY OF THE SOUTH PACIFIC



The IRCP collaborates with many institutions and scientific organizations in undertaking research projects in the South Pacific. Training is provided through a range of events, such as seminars and workshops that involve sharing and discussing research advances and demonstrations of the technical skills needed to manage coral reefs.

A total of 55 persons attended a workshop organized by the University of the South Pacific at Fiji (USP), the Secretariat of the Pacific Community in New Caledonia (SPC) and the CRIODE/IRCP that took place in Fiji September 9-12, 2014. The workshop had two primary objectives: 1) Increase capacity of USP, government and NGO staff already involved in coral taxonomy and coral reef monitoring (applied to 39 attendees), and 2) Teach USP students coral reef monitoring survey methods (16 students).

The first workshop activity involved reviewing coral taxonomy relevant to undertaking reef surveys in the south Pacific and included teaching coral taxonomy and coral identification basics to the participants. Students then practiced recognizing skeletal morphological features used in coral identification, including differentiating some of the most abundant coral genera of Fiji using an identification key that was designed for the workshop. All participants then completed a field exercise at Muaivuso to practice identifying coral genera in the field.



To meet the second workshop objective, four methods for surveying coral reef substrate were reviewed, discussed and practiced including: Line Intercept Transects, Point Intercept Transects, Point Intercept Quadrats as well as counting individual corals and estimating coral cover using visual assessments of Quadrats.

The coral and substrate data collected in the field at Muaivuso were analyzed on the last day to compare differences in coral abundance and species richness among the four methods. Attendees then participated in a discussion on the relative merits of each of the methods.

Action 2: Local workshops in French Polynesia

Shark-Human workshop



A workshop on shark-human interactions was organized by the IRCP and held at the CRIODE facilities in October of 2014, with financial support from the Pacific Funds for cultural and scientific cooperation. More than 30 French, international shark experts, marine and reef stakeholders attended. Attendees came from France, French Polynesia, Australia, Fiji, Samoa, New Caledonia, Colombia, and the United States of America (among others).

Attendees included renowned expert shark researchers, as well as marine and fisheries managers, and shark tourism operators. Everyone gathered to discuss the sustainable development of industries related to diving with sharks and to discuss the vulnerability of shark populations to ever-increasing human impacts.

Discussion topics included: the importance of sharks for marine ecosystem biodiversity, shark overfishing, the role and effectiveness of shark sanctuaries, shark tourism, the importance of sharks to the Polynesian culture and human-shark relationships.

The main output from the workshop is a review outlining the urgent priorities that need to be addressed to conserve shark and ray populations in the Pacific. More on ircp.pf

Taxonomic trainings at the CRIODE in Moorea



Since 2012, the IRCP has organized three trainings related to taxonomy for coral reef organisms, including: corals, mollusks and crustaceans. All three trainings consisted of lectures and classroom discussions in the mornings, collection and identification of specimens from reefs in northern Moorea in an afternoon. Each of the training leaders brought materials (presentations, taxonomy keys, and other documents and guides) that are now available to researchers and students working at the CRIODE.

The first training, on coral taxonomy, took place in 2012 and was led by renowned coral taxonomist Prof. Michel Pichon. The goal of this first workshop was to establish a database of the reef-building ('stony' or Scleractinian) corals of French Polynesia. The second training on mollusk taxonomy took place in 2013 and was led by Prof. Jean Trondlé. The third and most recent of the taxonomy trainings took place in 2014, with Prof. Joseph Poupin teaching attendees about crustaceans.

The taxonomy trainings were open to all CRIODE researchers as well as to university staff and students and to the staff of environmental conservation based NGOs and research institutions located in French Polynesia. Overall, the trainings greatly increased the scientific and taxonomic knowledge of all workshop attendees. More on ircp.pf

Action 3: IRCP grants for Master, PhD and post-doctorate students

Le MERIDIEN



Ecologic center
Meridien - Bora Bora

Since 2011, each year four grants have been awarded to early career scientists (<35 years old) of any nationality to conduct a scientific project based at the CRIODE facilities in Moorea, French Polynesia. The candidates are selected by the IRCP scientific committee, which includes some members of the Secretariat of the Pacific Community (SPC). Among the candidates selected each year, at least one candidate will come from South Pacific Island States in order to promote training for scientific research in these countries.

Examples of publications that include previous IRCP grant awardees:

Jérôme Payet, Ryan McMinds, Deron E. Burkepile, Rebecca L. Vega Thurber (2014) Unprecedented evidence for high viral abundance and lytic activity in coral reef waters of the South Pacific Ocean. *Frontier in Microbiology* 5:493-499.

David Lechini, Kevin Peyrusse, **Rynae Greta Lanyon**, Gaël Lecellier (2014) Importance of visual cues of conspecifics and predators during the habitat selection of coral reef fish larvae. *Comptes Rendus Biologies*, 337:345-351

David Lechini, Gaël Lecellier, **Rynae Greta Lanyon**, Sophie Holles, Bruno Poucet, Emilio Duran (2014) Variation in brain organization of coral reef fish larvae according to life history traits. *Brain Behaviour and Evolution*. 83:17-30

The 2014 selected candidates

Yashika Nand (Fiji Islands)

Research Title: **Comparing differential disease and bleaching responses of Pacific corals through a new coral susceptibility index (CSI): case studies from Leleuvia, Fiji and Moorea, French Polynesia.**

The key outcome will be to determine whether the relative susceptibility of different coral taxa remains constant or varies over large spatial scales. This will allow us to assess whether global and regional susceptibility measures are reasonable, or whether differences among species in susceptibility must be resolved locally.



Chloé Brahmi (France)

Research Title: **Using coral post-larvae to understand early colonization of live corals by microborers and effects of environmental stress on early stage coral skeleton.**

Understanding the dynamics of micro-bioerosion and the impacts of climate change on this early stage of calcification is of crucial importance to forecasting coral reef futures.



Christopher Freeman (USA)

Research Title: **Sponge-Microbe Symbioses in French Polynesia (CRIODE, Moorea).**

Dr. Freeman compared symbiont populations within sponges from different sites to observe how microbial community composition changes across sites in Moorea. First results showed that some sponges from Moorea host symbionts capable of photosynthesis.



Jodie Rummer (USA)

Research Title: **Nurture vs Nature, physiological tolerance to elevated environmental CO₂ in tropical sharks.**

The aims of her study are (i) to determine if metabolic performance is compromised, maintained, or enhanced upon acclimation to elevated CO₂, (ii) to determine the effects of CO₂ acclimation on the time to recover from exercise and (iii) to determine if hypoxia tolerance is affected upon acclimation to elevated CO₂.

Applications for IRCP GRANTS 2015

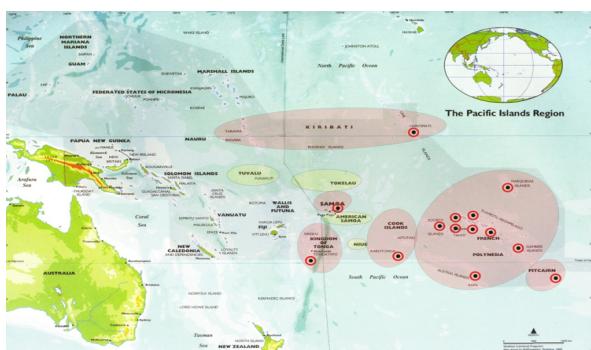
In the context of a partnership between Institute for Pacific Coral Reefs (IRCP) and two French Polynesian firms, Société des Nouveaux Hôtels (SNH) and Société Polynésienne de Développement Durable (SPDD), four grants are available to early career scientists (Master, PhD, Post-doctorate or degrees of similar levels, < 35 yrs) of French nationality or foreigners to conduct a scientific project in the French Polynesia coral reefs.

Each grant is for 4500 € (euros) to cover travel expenses to and from French Polynesia and for accommodation and research expenses.

For more information about the projects conducted during 2014, see the website www.ircp.pf

Action 4: Coral reef monitoring in the south Pacific

One of the essential objectives of the IRCP is to maintain a monitoring network of coral reefs in the South Pacific (<http://observatoire.criobe.pf/CRIOBEData/>). The IRCP relies on the CRIODE, in collaboration with the observation service "CORAIL" (CNRS - INSU), for this as CRIODE scientists developed the Polynesia Mana monitoring network, which includes survey sites at 15 islands and has been maintained for 20 years (see the interview of Yannick Chancerelle on p.1).



Marquesas Islands under scrutiny

The traditional monitoring surveys were recently completed on Nuku Hiva (Marquesas Islands) in September, 2014 by engineers of the CRIODE station. The Marquesas survey site was established in 2008.

Gilles Siu counted and identified reef fish using 25m long transects. Vetea Liao assessed coral cover with the quadrat method. The two engineers also set up an instrument that will measure the heights of waves and record temperatures.

The Marquesas Islands have low coral diversity but reef fish are abundant and the waters are rich in plankton, which provides food to the abundant manta rays in the region.



*More about
the IRCP
on the website
[www.ircp.pf](http://www ircp pf)*



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Vetea Liao and Gilles Siu / photo X. Curvat

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