NOTE TECHNIQUE

Bilan et propositions du symposium et atelier de travail « Paléo- et Néo-Ecologie en Polynésie française »

par

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Synthèse (en français)

Le symposium international et atelier de travail « Paléo- et Néo-écologie en Polynésie française » a été organisé conjointement par le gouvernement de la Polynésie française (Délégation à la Recherche), l'University of California at Berkeley, l'association « ProScience - Te Turu 'Ihi », l'association « Te Pu Atiti'a » et l'Université de la Polynésie française. Il s'est tenu du 29 novembre au 1er décembre 2011 à la Station de recherche biologique Richard Gump (antenne de l'UC Berkeley) dans l'île de Mo'orea.

Lors de cette conférence, **environ 40 participants**, chercheurs (archéologues, anthropologues, paléo-écologues, palynologues, anthracologues, écologues marins et terrestres, botanistes, ornithologues, malacologues, entomologistes, généticiens) de diverses institutions de France métropolitaine et de Polynésie française, des Etats-Unis d'Amérique dont les îles Hawaii, d'Australie et de Nouvelle-Zélande, représentants des services du gouvernement de Polynésie française (Délégation à la recherche, Direction de l'environnement, Service de la culture et du patrimoine, Service du développement rural), et membres d'associations locales de protection du patrimoine naturel et culturel de Tahiti, Mo'orea et Rai'atea, ont partagé et confronté leurs idées, théories, méthodes et résultats (http://www.li-an.fr/jyves/Paleo_Neo_Ecologie_Programme_Final_Moorea_2011.pdf).

Un total de **18 communications** a été présenté, démontrant à la fois la richesse et la qualité des recherches menées en paléo- et néo-écologie en Polynésie française lors des deux dernières décennies, notamment aux Australes (Rapa, Raivavae, Rimatara, Rurutu, Tubuai), Marquises (Nuku Hiva, Ua Huka), Gambier (Mangareva) et Société (Tahiti, Moorea, Maupiti), par des institutions et des équipes différentes (principalement l'Australian National University, le Bishop Museum de Honolulu, la Délégation à la Recherche, le Muséum national d'Histoire naturelle de Paris, le Service de la Culture et du Patrimoine, l'Université de la Polynésie française, l'University of California at Berkeley et l'University of Auckland).

Des données importantes sur la colonisation humaine et sa chronologie en Polynésie, les impacts sur les environnement anciens et actuels, l'extinction passée et contemporaine d'espèces végétales et animales, les espèces introduites envahissantes, les assemblages des communautés végétales et animales passées et présentes, l'apport bénéfique de l'outil moléculaire et des phylogénies, ont été présentées, la plupart de ces résultats ayant été publiés dans des revues scientifiques internationales.

Malgré ces résultats importants et de nombreux programmes de recherche en cours, les participants ont proposé de consolider la façon dont ils mènent leurs recherches dans les disciplines de la paléo- et la néo-écologie afin d'améliorer à la fois la qualité de leur propres travaux et de contribuer aux stratégies de conservation des patrimoines naturels et culturels de Polynésie française.

Leurs recommandations sont les suivantes :

RECHERCHE

- Promouvoir des programmes de recherche multidisciplinaires (paléo- et néo-écologie) et encourager la constitution d'équipes multidisciplinaires sur le terrain ;
- Travailler en commun dans des sites-clef, représentatifs des différents écosystèmes (par exemple : îles volcaniques jeunes *vs* anciennes, atolls soulevés, petites *vs* grandes îles, îles tropicales *vs* équatoriales *vs* subtropicales) ;
- Essayer de combler les trous dans la connaissance sur des sujets plus spécifiques (par exemple les interactions entre espèces, la longévité des arbres, la répartition des moustiques, la taxonomie des escargots, le régime des feux, les coprolithes, etc.) ;
- Associer d'autres disciplines scientifiques comme la géologie, la géomorphologie, la sédimentologie, les sciences humaines et sociales (par exemple les historiens, les ethnologues), en utilisant une approche « socio-écosystémique » ;
- Essayer d'intégrer des étudiants polynésiens aux programmes de recherche.

COMMUNICATION & EDUCATION

- Mettre en place un portail internet pour le partage de l'information (incluant la liste des programmes anciens ou en cours, le profil des chercheurs et leurs domaine d'expertise, des liens internet aux institutions et aux bases de données, des cartes, les publications, le planning des missions sur le terrain) ;
- Développer la vulgarisation et favoriser la restitution des résultats pour les communautés locales (dans leurs langues particulières) à travers la collaboration avec des associations locales (ONG) ;
- Développer des outils d'éducation et de formation pour les professeurs d'école (comme par exemple sur le modèle des séminaires « à l'Ecole de la Biodiversité », « à l'Ecole de la Forêt », « à l'Ecole du Récif »…) ;
- Intégrer les savoirs traditionnels dans les programmes de recherche.

CONSERVATION & PROTECTION

- Renforcer la protection des sites archéologiques ;
- Hiérarchiser les espèces pour la conservation (par exemple espèces clef-de-voûte *vs* espèces charismatiques en danger) ;
- Mettre en place des projets de restauration écologique pour comprendre et tester la structure, la composition et le fonctionnement des écosystèmes, ainsi que leur résilience avec le temps ;
- Suivre la dynamique des populations des espèces indigènes et introduites, avec l'aide d'un réseau de collaborateurs locaux ou d'association locales ;
- Considérer les processus évolutifs et soutenir les études génétiques et les phylogénies (par exemple privilégier les espèces et lignées à forte valeur taxonomique) ;
- Considérer la nécessité du « sauvetage d'espèces » (« species salvage ») pour des groupes comme les mollusques en voie d'extinction.

Synthesis (in English)

The international "Palaeo- and Neo-Ecology Symposium and Workshop" organized by the Government of French Polynesia (Délégation à la Recherche), the University of California at Berkeley, the NGO "ProScience - Te Turu 'Ihi", the NGO "Te Pu Atiti'a" and the University of French Polynesia, was held at the Richard Gump Biological Research Station (UC Berkeley antenna) on the island of Mo'orea between November 29 and December 1, 2011.

About **40 participants**, including researchers (archaeologist, anthropologists, paleao-ecologist, palynologist, anthracologists, marine and terrestrial ecologists, botanists, ornithologists, malacologists, entomologists, geneticists) from various institutions in French Polynesia and France, the United States of America including Hawaii, Australia and New-Zealand, as well as representatives of the French Polynesian governmental departments of Research, Environment, Agriculture, Culture, and members of natural and cultural heritage protection local groups/NGO's/"associations" (from Tahiti, Mo'orea, and Rai'atea) attended this conference to share and discuss their research goals, methods, theories, and results (http://www.li-an.fr/jyves/Paleo_Neo_Ecology_Final_Program_Moorea_2011.pdf).

A total of **18 talks** were presented, covering many research studies in palaeo-and neo-ecology which have been conducted in French Polynesia over the past two decades, especially in the Australs (Rapa, Raivavae, Rimatara, Rurutu, Tubuai), the Marquesas (Nuku Hiva, Ua Huka), the Gambier (Mangareva) and the Society islands (Tahiti, Moorea, Maupiti) by various scientific institutions and teams (mainly the Australian National University, the Bishop Museum of Honolulu, the Délégation à la Recherche, the National Museum of Natural History of Paris, the Service de la Culture et du Patrimoine, the University of French Polynesia the University of California at Berkeley, the University of Auckland).

Important data on initial human colonization and chronology in Polynesia, past and current human impacts on island environments, past and contemporary extinction of plant and animal species, introduced and invasive species, past and current plant and animal community assemblages, the beneficial use of molecular tools and phylogenies, were presented. Most of this research has been published in scientific journals.

Despite these important results and on-going programs, the participants have made proposals to consolidate the way they are doing research in the fields of palaeo-ecology and neo-ecology in order to improve their own work and to contribute to the biodiversity and cultural heritage conservation strategies in French Polynesia.

Their main recommendations are:

RESEARCH

- To promote multi-disciplinary (palaeo- & neo-ecology) research programs and encourage multi-disciplinary teams in the field;
- To work in common key-sites, representative of different ecosystems (e.g. young versus old high volcanic islands, raised atolls, small *vs* large, tropical *vs* equatorial *vs* subtropical climate);

- To seek to fill in knowledge gaps for specific issues (e.g. species interactions, tree life-spans, mosquitoes distribution, snail taxonomy, fire regimes, coprolites, etc.);
- To involve other research disciplines such as geology, geomorphology, sedimentology, social and human sciences (e.g. historians, ethnologists), and to use a comprehensive "socio-ecosystem" approach;
- To seek to integrate French Polynesian students in research programs.

COMMUNICATION & EDUCATION

- To set up an internet portal for sharing information (past and current research programs, researcher profiles and expertises, website links to various institution and databases, maps, publications, field-trips schedules in French Polynesia…);
- To develop public outreach especially with local communities (in their specific languages) through the help of local "associations"/NGOs;
- To develop educational tools and training for schoolteachers (*cf.* the seminars such as "à l'Ecole de la Biodiversité", "à l'Ecole de la Forêt", "à l'Ecole du Récif");
- To integrate traditional knowledge into their research programs.

CONSERVATION & PROTECTION

- To reinforce the protection of archaeological sites;
- To prioritize species for urgent conservation (e.g. keystone species versus endangered charismatic species);
- To set up ecological restoration projects to test about the structure, composition and ecosystem functioning, as well as their resilience with time;
- To monitor population dynamics of both native and introduced species, with the help of a network of local groups/associations;
- To consider evolutionary processes, and support more genetic studies, phylogenies (e.g. prioritization of species/lineages of high taxonomical value);
- To consider the necessity of "species salvage" (e.g. for endemic molluscs on the verge of extinction).

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ANNEXE : Notes prises lors de la discussion finale

Janet WILMSHURST: *need to date rat-gnawed seed assemblages from E. Polynesian natural and archaeological sites in order to help resolve the debate over timing of initial human arrival.*

Matiu PREBBLE: *rapid assessment of potential depositional environments and their archives throughout the islands/archipelagoes of French Polynesia; target Rapa (Australs) For an intensive study.*

Hervé BOSSIN: *1. Take advantage of researchers going to remote islands to collect mosquito samples; 2. Modeling of mosquito distribution in relation to environmental factors and human factors; 3. Reconstructing the distribution of Aedes polynesiensis – population genetics of the mosquito and linking it with rats.*

Emilie DOTTE: *creation of a web-based portal for sharing information about on-going research projects on palaeo- and neo-ecology, sharing data, maps, etc. ; also sharing information on available reference collections, databases, and who/what institutions are available to help identify plant or animal materials.*

Emilie DOTTE: *more research on the life-spans of trees in French Polynesia and Pacific Islands.*

Don DRAKE: *encourage the formation of multi-disciplinary teams to combine expertise in palaeo-ecology, archaeology, neo-ecology to address large problems. These groups don't necessarily have to work at the same time. However, by concentrating multiple approaches at key sites, we can obviously build up more complete pictures of how the sites function. And, we can choose a range of types of sites to get a good, representative picture of the ecosystems of French Polynesia. It would be nice if we had a matrix or table showing what has and hasn't been done in various places. That could help others choose sites that are missing key types of information ; 2. Need data on plant/animal interactions before species go extinct so that the palaeo-records can be better interpreted, and ecological restoration can be planned.*

Helen JAMES: *need a focus on ecological interactions, both neo- and palaeo-; to understand the history of ecological change and the consequences for modern ecosystem management, including a perspective of both paleontological and archaeological histories, and modern ecology.*

Melinda ALLEN: *don't ignore the Marquesas!; more palaeo-ecology in partnership with archaeologists.*

Pat KIRCH: *Society Island are understudied and little understood in relation to other islands and archipelagoes of French Polynesia.*

Rosie GILLESPIE: *need to understand more about species communities over time; need reference collection for the arthropods so that paleontological specimens can be properly identified.*

Olivier GARGOMINY: *Paris Museum has already a web based database for biodiversity data (INPN), both neo and archaeological (for metropolitan France) that can be expanded to French Polynesia; already includes the land snails of French Polynesia.*

Olivier GARGOMINY: *promote the use of land snails in the study of biodiversity in the islands - more collaboration on species interactions; taxonomy is important; focus on makatea (raised limestone) islands.*

Jean-Claude THIBAULT: *need to collaborate with historians in order to tap into the record of biological changes - both introduction of alien species (e.g.. black rat Rattus rattus), and also records of local extinctions/extirpations for native and endemics; records on cat introductions.*

Frank MURPHY: *make use of the Moorea Biocode database; The Centre Atiti'a may also be a good source of collaboration for traditional knowledge on plant uses.*

Stéphanie THIEBAULT: *need to include the perspective of geomorphology, sedimentology ; micromorphology.*

Melinda ALLEN: *encourage the Ministry of Education to work with researchers to help to educate the general public, students, etc. on the results of work conducted on biodiversity; training for school teachers; translation of reports into French (for Anglophones), and into Tahitian, etc.*

Jenny KAHN: *encourage researchers to incorporate outreach into their projects; as a funded part of the research grants, etc. in order to disseminate results to local communities; give the opportunity to Université de la Polynésie française students to participate to fieldworks.*

Paul NIVA: *protect the 'Opunohu Valley, one of the last valleys that still preserves archaeological and natural environment; it is public land but should be held as a public trust; should be protected by law; extend to all potentially high interest archaeological sites.*

Olivier GARGOMINY: *historians also provide important data on the early naturalists who collected specimens in the Pacific.*

Jean-Yves MEYER: *encourage the development of research programs at UPF in the areas of palaeo- and neo-ecology! Also the importance of social and human sciences.*

Steve ATHENS: *very tight archaeological chronology for initial settlement and sedimentary deposition along the coastal margins.*

Michel CHARLEUX: *need for a geological samples database.*

Robin POUTEAU: *the central role of humans in islands—can humans actually co-exist sustainably on islands?*

Benoît FONTAINE: *Setting up monitoring programs for introduced species would allow monitoring the dynamics of colonization, which has rarely been done. It would also help*

understand/foresee their impact on native species. Indeed, in French Polynesia, it is often heard that a given introduced species used to be more abundant before, and that its numbers have decreased. It is the case for the populations of the snails Achatina fulica and Euglandina rosea, which might have decreased. However, such rumors cannot be verified without monitoring. This would most easily been done on birds, a group where introduced species (common mynah, red-vented bulbul, zebra dove, harrier, waxbills, etc.) would be monitored simultaneously with native species (fruit doves and kingfishers for instance), with tested protocols such as point counts. Local NGO's should be associated for the implementation of bird monitoring. Monitoring of other groups (introduced snails, introduced ants) would also be very informative, but would need dedicated protocols. The Muséum national d'Histoire naturelle, with its program "Vigie Nature", is willing to help designing the protocols and sampling plan.

Ravahere TAPUTUARAI: *encourage intellectual exchanges between palaeo- and neo-researchers.*

Don DRAKE: *initiation of ecological restoration projects to test hypotheses about ecosystem composition, structure and functioning, and to enhance conservation.*

Tiffany LAITAME: *don't forget the traditional and cultural aspects in each island; take into account traditional values and knowledge.*

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