

Taxonomic inventory of Scleractinia in French overseas territories

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Abstract. The French Coral Reef Initiative (IFRECOR) has initiated a programme in the French overseas territories in order to centralise the management of reef biodiversity data and to improve access to this information, in particular by coral reefs managers. The French Government, through IFRECOR, has entrusted the National Museum of Natural History (MNHN, Paris) with the development of biodiversity inventories for coral reef systems across its overseas territories. The Natural Heritage Department of the MNHN (Service du Patrimoine Naturel) manages France's national inventory of natural heritage (Inventaire National du Patrimoine Naturel, INPN) and all related databases. This information can be accessed by managers in order, for example, to tailor specific conservation measures to relevant habitats or species in a geographical area. Diversity and distribution data are collected for all taxonomic groups associated with coral reefs, in close collaboration with taxonomic experts and local overseas IFRECOR committees. Raw data are then processed, verified and integrated, and taxonomic reference lists by geographic are generated. Finally, the MNHN diffuses this information via the INPN website (<http://inpn.mnhn.fr>). With respect to scleractinian corals, the taxonomic inventory for all French overseas coral reefs is now complete. The inventory includes 463 species of Scleractinian corals in reefs developed in the Pacific, Atlantic and Indian Oceans. The number of species are : New Caledonia 344; Wallis and Futuna 184; French Polynesia 194; Clipperton 17; Martinique 53; Guadeloupe 42; Saint-Martin 30; Saint-Barthélemy 48; Mayotte 212; La Réunion 167; and Iles Eparses 62.

Key words: Scleractinia, coral reefs, inventory, French overseas territories, New Caledonia, Wallis and Futuna, French Polynesia, Clipperton, Martinique, Guadeloupe, Saint-Martin, Saint-Barthélemy, Mayotte, Réunion, Iles Eparses.

Introduction

In 2006 the national committee of the French Coral Reef Initiative (IFRECOR, the French initiative of ICRI – International Coral Reef Initiative), introduced a cross-cutting work stream entitled "Biodiversity". This project was developed to provide open access to information on coral reef biodiversity in French overseas territories, particularly for coral reef managers. Given the abundance of data on this topic, it was necessary to develop an appropriate structure for online data sharing at national and international levels.

Within France, the National Museum of Natural History (MNHN) is responsible for maintaining a national biodiversity inventory, and manages, through its Natural Heritage Department (Service du Patrimoine Naturel, SPN), the National Inventory of Natural Heritage (Inventaire National du Patrimoine Naturel, INPN). After ensuring consistency with agreed taxonomic registers at a national and international level (e.g. World Register of Marine Species), the MNHN makes biodiversity information

available on behalf of the French Government. The information is accessible via the INPN website (<http://inpn.mnhn.fr>), so that it can be used, analysed and summarised by any users according to specific research or management requirements.

IFRECOR decided at its national committee meeting of April 2008 that the MNHN should be responsible for collecting, processing, validating and making available data relating to coral reef biodiversity. Scleractinian corals were chosen as a priority taxonomic group. This document presents the results of this taxonomic inventory of Scleractinian corals in French overseas territories.

Material and Methods

The INPN website is managed by the SPN and provides online information on the natural heritage of mainland France and its overseas territories (plant and animal species, natural habitats, protected areas and geology). It draws on data available from the MNHN and its network of partner organizations. France's National Inventory of Natural Heritage is the result of

a lengthy project involving scientists, national and regional authorities, naturalists and nature protection organizations, with the aim of taking stock of the natural heritage of France. The information currently available online is 'alive' in two ways. Firstly, because this site is a tool for understanding and managing living creatures; and secondly because the site 'evolves' through inputs from partner organizations.

The lists of scleractinian species were drawn up from various sources for each French overseas territory, and, after validation by expert taxonomists, have been integrated into the French taxonomic register called TAXREF. TAXREF is one of the main corner stone of the INPN Information System: it provides the relevant names of all species of continental and marine fungi, plants and animals for metropolitan and overseas France. As any taxonomic work, it aims at giving one name for one biological species, which imposes in particular to consolidate local checklists (i.e. resolving the different names under which one same species can be cited from different geographical units) and finally ensuring permanent link and consistency with Global Species Database (GSD, such as WoRMS, Appeltans *et al.* 2011).

Data collection

The lists of scleractinian species were drawn up in collaboration with local committees of IFRECOR, according to specifications defined by the MNHN (Joannot and Ringelstein 2010). It gathers various sources: in some cases, the local or regional lists of species come from publications, while in other cases these lists were directly established by specialists. The references are presented in Table 1 for each French overseas territory, and are registered in Gargominy *et al.* 2011.

French territory	References
Martinique	Brugneaux & Peres 2006
	Laborel 1986
Guadeloupe, Saint-Martin, Saint-Barthélemy	Humann 1999
	Sterrer 1986
	Veron 2000
	Wood & Wood 2000
	Bouchon C. (UAG) pers. comm.
Mayotte	Wickel 2004
	List drawn up by Michel Pichon
Iles Eparses	List drawn up by Michel Pichon (using lists from Quod JP. (ARVAM), Bouchon C. (UAG), and Bigot L. (Université de la Réunion))

La Réunion	Faure 1982
	Faure <i>et al.</i> 2008
New Caledonia	Pichon 2007
	List drawn up by IRD Nouméa from the "Lagplon" database
Wallis and Futuna	Payri <i>et al.</i> 2002
	Pichon <i>et al.</i> 2007
French Polynesia	Pichon in Glynn <i>et al.</i> 2007
Clipperton	Flot & Adjeroud <i>in</i> Charpy 2009

Table 1: References used to establish the lists of scleractinian species for each French overseas territory

Data processing

The lists of scleractinian species were processed within the context of TAXREF, and have been matched with the World Register of Marine Species (WoRMS, <http://www.marinespecies.org>, Scleractinia group editors: S. Cairns & B. Hoeksema) in order to follow international standards. This register has its origins in the European Register of Marine Species (ERMS), and was combined with several other species registers maintained at the Flanders Marine Institute (VLIZ). VLIZ developed a consolidated database called 'Aphia'. MarineSpecies.org is the web interface for this database. WoRMS is still under development, and continues to combine information from Aphia with other authoritative marine species lists which are maintained by other organisations (e.g. AlgaeBase, FishBase, Hexacorallia, NeMys) (Appeltans *et al.* 2011).

All lists of marine species are verified via WoRMS before being integrated into the French taxonomic register TAXREF. French species lists were automatically matched with the WoRMS Taxon Match Tool. After matching, the tool returns the lists with the AphiaID's, valid names, authorities, and WoRMS classification.

Updating TAXREF

The lists of scleractinian species are matched within TAXREF, using the following TAXREF methodology (Fig. 1).

If the species is already in TAXREF, its biogeographic status is updated for each French overseas territory. Any new species for TAXREF, if validated by a specialist, are added to TAXREF with a unique identifier (CD_NOM). A request is sent to WoRMS for the addition of taxa which are not yet in this world register.

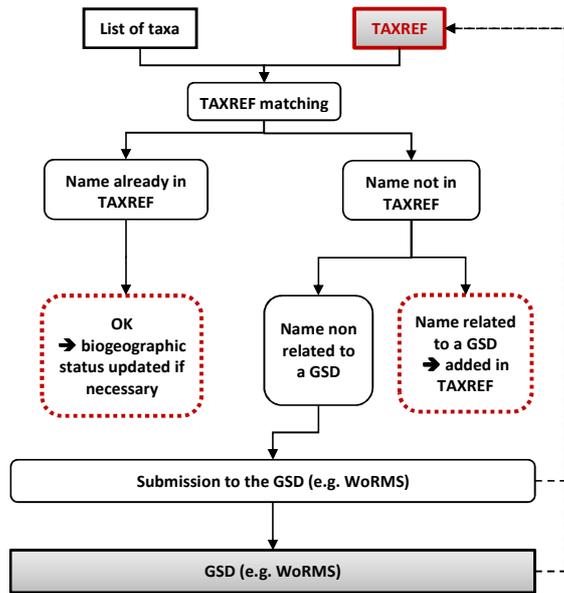


Figure 1: Methodology implemented between TAXREF and the Global Species Database (GSD) (Gargominy & Tercerie 2011). Grey boxes: taxonomic registers; Red outline: related to TAXREF.

Validation

The lists of scleractinian species are all checked, updated, and validated by our taxonomic referee (M. Pichon).

Results

To date, 463 species of scleractinian corals have been identified in French overseas territories but one should stress that this is a provisional result. Given that some additional collecting is still necessary in some instances (e.g. for Futuna) and given that the validation of the lists is not yet complete, these numbers will undoubtedly evolve.

Table 2 gives the number of scleractinian species for each territory.

French overseas territory	Scleractinia
Guadeloupe	42
Martinique	53
Saint-Martin	30
Saint-Barthélemy	48
Mayotte	212
La Réunion	167
Iles Eparses	62
New-Caledonia	344
Wallis and Futuna	184
French Polynesia	194
Clipperton	17

Table 2: Number of scleractinian species per French overseas territory.

For the overseas territories situated in the Indo-pacific Ocean, the bulk of the scleractinian fauna consists mostly of a subset of the general Indo-Pacific coral fauna (which may be much impoverished, e.g. Clipperton atoll). A small number of species with a more restricted local or regional distribution complement the group of species with a larger Indo-pacific distribution. Typical examples are *Pavona gigantea* and *Porites arnaudi* (eastern Pacific) in Clipperton, *Napopora irregularis* (eastern central Pacific) in French Polynesia, *Cantharellus noumeae* and *Barabattoia mirabilis* (local distribution), in New Caledonia, *Madracis hellana* and *Horastrea indica* (SW Indian Ocean) *Favites peresi* and *Gyrosmlia interrupta* (western Indian Ocean) in La Réunion and Mayotte, *Craterastrea levis* (western Indian Ocean) in Mayotte.

The lists of species are available online (INPN website) and the French taxonomic register TAXREF can be downloaded (version 4.0 has been available since 12th October 2011 :

<http://inpn.mnhn.fr/telechargement/referentielEspece>).

This website provides information on each species, including its occurrence in each French overseas territory (e.g. Fig. 2), its distribution, its classification, and its protection status. Distribution data for scleractinian species is also collected within the context of the IFRECOR program.

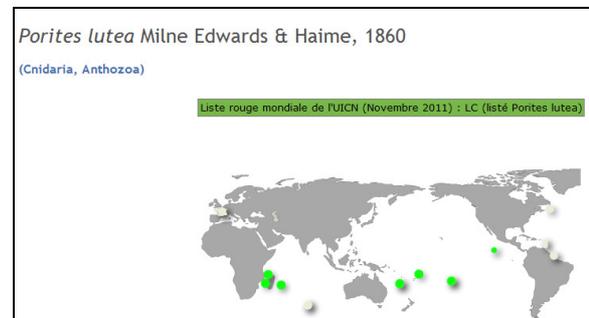


Figure 2: An example of the occurrence of one species, *Porites lutea* in the French overseas territories (accessed from <http://inpn.mnhn.fr> on 14/02/2012)

Discussion

Current knowledge of French scleractinian corals is the result of a collective effort, and the commitment and enthusiasm of multiple partners across mainland and overseas France. The data generated highlights France's responsibility for the management and the protection of coral reefs at a global level: Approximately 55% of scleractinian species currently described are found overall in the reefs developed in the various French overseas territories.

However, the taxonomic inventory of scleractinian corals in French overseas territories is still far from complete, and further updates will depend on future oceanographic surveys and research programmes.

IFRECOR, by entrusting this long term responsibility to the MNHN, wishes to provide open access to validated biological information so that coral reef managers have an overview of species distribution in the French overseas territories.

This work illustrates the need for similar cross-cutting work streams across research and environment management.

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References

- Appeltans W, Bouchet P, Boxshall GA, Fauchald K, Gordon DP, Hoeksema BW, Poore GCB, van Soest RWM, Stöhr S, Walter TC, Costello MJ (eds) (2011) World Register of Marine Species. Accessed at <http://www.marinespecies.org>
- Brugneaux S, Peres C (2006) Contribution aux inventaires floristiques et faunistiques de Martinique – Programme ZNIEFF Mer - Le récif méridional de la Martinique (Synthèse). OMMM, Fort de France, p 33
- Faure G (1982) Recherche sur les peuplements de Scléactiniaires des récifs coralliens de l'Archipel des Mascareignes (Océan Indien Occidental). Doctorat ès Sciences, (Annexe). Université d'Aix-Marseille II, Marseille
- Faure G, Pichon M, Geynet Y (2008) Liste des espèces de coraux scléactiniaires des Mascareignes, d'après Faure (1982), mis à jour. Université de la Réunion
- Flot JF, Adjeroud M (2009) Les coraux de Clipperton. in Charpy L (ed) Clipperton, environnement et biodiversité d'un microcosme océanique. Patrimoines naturels, MNHN & IRD, Paris, 68:155-162
- Gargominy O, Tercerie S (2011) Méthodologie TAXREF. SPN, MNHN, Paris, unpublished
- Gargominy O, Tercerie S, Régnier C, Vandell E (2011) TAXREF v4.0 Sources. SPN, MNHN, Paris, p 28
- Glynn PW, Wellington GM, Riegl B, Olson DB, Borneman E, Wieters EA (2007) Diversity and Biogeography of the Scleractinian Coral Fauna of Easter Island (Rapa Nui). *Pac Sci* 61(1):67-90
- Humann P (1999) Invertébrés coralliens, Identification. Floride Caraïbes Bahamas. Éditions PLB, p 320
- Joannot P, Ringelstein J (2010) Bilan du TIT Biodiversité 2006-2010. Rapport comité national de l'IFRECOR, p 38
- Laborel J (1986) Mission Corantilles 2 sur les côtes de la Martinique. *Annls Inst Océanogr*, Paris, 62(2):193-198
- Pichon M (2007) Scleractinia of New Caledonia: check list of reef dwelling species. in: Payri C, Richer de Forges B (eds) Compendium of marine species of New Caledonia. *Doc Sci Tech*, IRD, Nouméa, II7(2):149-157
- Pichon M, Benzoni F, Seguin F (2007) Contribution à l'étude de la biodiversité dans les récifs coralliens de Wallis - Coraux Scléactiniaires, p 33
- Payri CE, Pichon M, Benzoni F, N'Yeurt ADR, Verbruggen H, Andréfouët S (2002) Contribution à l'étude de la biodiversité dans les récifs coralliens de Wallis : scléactiniaires et macrophytes. Rapport Atelier Marin Wallis, IRD Noumea, p 54
- Sterrer W (ed) (1986) Marine fauna and flora of Bermuda: a systematic guide to the identification of marine organisms. John Wiley & Sons, New York, p 742
- Veron JEN (2000) Corals of the world. Volume 1: Atlantic and Eastern Pacific. AIMS, Townsville, p 463
- Wickel J (2004) Inventaire des poissons, coraux (Scléactiniaires) et mammifères marins identifiés à Mayotte (Océan Indien). Rapport DAF/SPEM, p 22
- Wood E, Wood L (2000) Les récifs des Caraïbes. Poissons, coraux et invertébrés. Könenmann, p 144