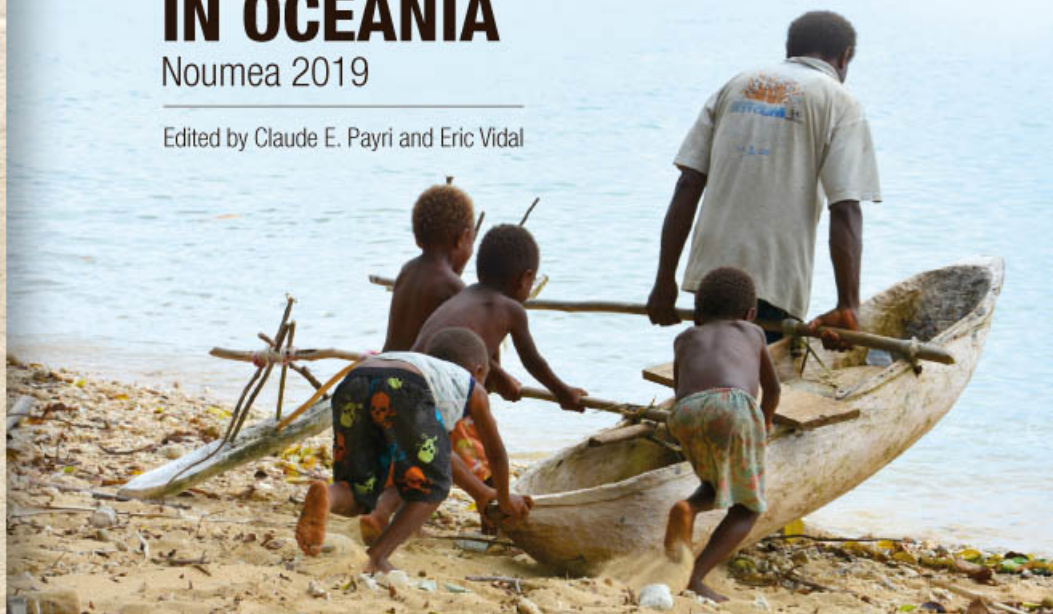


# BIODIVERSITY, A PRESSING NEED FOR ACTION IN OCEANIA

Noumea 2019

Edited by Claude E. Payri and Eric Vidal



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**Cipa pai picaapwi kârâ âboro mâ Göröpuu mâ Nâwië**

**Manaaki tangata, Manaaki whenua, Manaaki moana, kia kotahi whakahaere ki mua**

**Waa cèki céfé tö vèâ pâfâ Kâmö, Bwêêjë mâ Nérhëë mâi**

**Tausia lelei o tatou tagata, laueleele, ogasami, malaga fa'atasi i le agaga e tasi**

**Ta'ofi ke ma'u fakatasi le Tagata, le Kele mo le Moana**

**Icaasikeune la itre atr, hnadro me hnagejë**

**Co aodeneni Ngome ne Rawe ne Cele**

**Strengthening connections between people, islands and the ocean in the Pacific**

**E hakatahi'ia to te Enana i te Henua me te Tai**

**Me vakaqacotaki na veiwakani ni tamata vata kei na nodra vei yanuyanu kei na nodra vanua kei na wasa liwa kei na kedra yau bula vakavolivolita na Pasifika.**

**Kraon, solwota mo pipol emi wan oltime**

**Kia vai kôrari noa te Tagata, te Henua e te Moana**

**E natira'a mana tö te ta'ata i te moana 'e te fenua**

**Tâ'ofi ke ma'u fakatahi te Ha'atagata, te Fenua mo te Moana**

**Me vakaqacotaki na veiwakani ni tamata vata kei na nodra vei yanuyanu kei na nodra vanua kei na wasa liwa kei na kedra yau bula vakavolivolita na Pasifika.**

**Ntano ngo ntas epei Namouriana**

**Maintenir unis les Hommes, la Terre et l'Océan**

**Buildim wan yunion wetem ol pipol, ol aelan mo solwara mo ol plant mo anamol long Pasifik**

**Ke fakamanlohingi ange ngae nganhi fehokotakinganga ngö e kakai ngö e nganhi ngötu motu ngö e Pasifiki pea mo honau nganhi fonuwa, kae umanga ngae moana, pea moe menga mongui kotoa pe ngoku iai.**

**Waa cèki céfé tö vèâ pâfâ Kâmö, Bwêêjë mâ Nérhëë mâi**

# **BIODIVERSITY, A PRESSING NEED FOR ACTION IN OCEANIA**

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The authors of the book would like to warmly thank the many people who made it possible to translate the “tagline” of this synthesis work into Oceanian languages, especially the members of the various Oceania language academies, the invited speakers, and the numerous colleagues who forwarded our request. Following this exercise, a large number of different adaptations of this “tagline” have emerged, once again reflecting the vibrant cultural and philosophical diversity of this region of the world.



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ISBN : 979-10-91032-09-4

Presses universitaires de la Nouvelle-Calédonie  
Avenue James Cook – BP R4 – 98851  
Nouméa CEDEX, New Caledonia  
unc.nc



Proofreading, editing and layout design support: Françoise Cayrol for the PUNC; Estelle Bonnet-Vidal for Lincks  
Translated from French into English by Lydiane Mattio/blue[c]weed  
SPC translators for Foreword and Afterword  
Published by Françoise Cayrol for the PUNC  
Layout : ©éteek  
Printed by Graphoprint Noumea, August 2019

Recommended citation:  
C. E. Payri et E. Vidal (Eds), 2019, *Biodiversity, a pressing need for action in Oceania. Noumea 2019*,  
Presses Universitaires de la Nouvelle-Calédonie (PUNC), Noumea, New Caledonia, 64 p.

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# SUMMARY

Acknowledgments	6
Foreword	8
Excerpts from introductory speeches	10
Introduction	12

## Part 1

<i>Biodiversity, ecosystem services and socio-economic activities using natural resources</i>	<b>17</b>
---	-----------

An exceptional natural and cultural heritage	18
A region under pressure	22
It is not too late to take action	26

## Part 2

<i>Protected and managed terrestrial and marine areas</i>	<b>31</b>
---	-----------

The specific features of Oceanian protected areas	32
Protected areas that address huge environmental and societal challenges	34
Strengthening a governance based on inclusive systems of co-management	37

## Part 3

<i>Biodiversity, endogenous and customary law, and traditional knowledge</i>	<b>41</b>
--	-----------

An environmental law that is currently not achieving its objective	42
Safeguarding traditional knowledge to protect biodiversity	44
Ensuring the effectiveness of the law to prevent environmental damage	48
Implementing a new paradigm in Oceania: consider Man as part of Nature and reconcile them	50
Taking action	51

## Perspectives

Heading to Kunming	<b>53</b>
	54

Afterword	56
For further information	58
List of acronyms	60
List of workshop participants	61



# ACKNOWLEDGMENTS



*Workshop participants, Noumea, 24-25 June 2019 ©SPC.*

We acknowledge the 140 experts and participants from Oceania, Europe, and Canada who shared their knowledge over two days to provide decision-makers, with specific background information and opportunities to reduce threats to biodiversity and ecosystem services in the Oceania region. The coordinators who assumed responsibility for and facilitated the various workshops are also warmly thanked for their contribution to the drafting of the texts of this collective synthesis document.

We would like to thank the Pacific Community (SPC), the Secretariat of the Pacific Regional

Environment Program (SPREP), the Department of Regional Cooperation and External Relations (SCRRE), the Research Consortia of New Caledonia (Consortium of Cooperation for Research, Higher Education and Innovation in New Caledonia - CRESICA) and French Polynesia (Research, Higher Education Innovation for Polynesia - RESIPOL), the French Foundation for Research on Biodiversity (FRB) and the Research Institute for Development (IRD) for their institutional support. We would also like to thank the members of the operational committee for the preparation and successful implementation of these workshops.





We express our gratitude to SPC General Director, Colin Tukuitonga, to the President of the Government of New Caledonia, Philippe Germain, and to the President and CEO of IRD, Jean-Paul Moatti, who have enthusiastically proposed and supported this initiative.

The University of New Caledonia (UNC), the New Caledonian Institute of Agronomy (IAC), SPC, IRD, the French National Museum of Natural History, the University of French Polynesia (UPF) and the French Embassies in Australia and New Zealand generously covered the costs of the event.

Many colleagues and members of the support services within the IRD, UNC, and SPC have been extensively involved. We want to thank them warmly for this.

Finally, we would like to thank the Presses Universitaires de Nouvelle-Calédonie (PUNC), the editorial coordinator, Françoise Cayrol, and the President of the University of New Caledonia, Gaël Lagadec, who made the publication of this book possible.

# FOREWORD

## PROTECTING BIODIVERSITY IN OCEANIA: A SCIENTIFIC, HUMAN AND POLITICAL EMERGENCY



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Cameron Diver,  
Deputy Director-General,  
Pacific Community (SPC)

Professor Jean-Paul Moatti,  
Chairman of the Board/CEO,  
French National Research  
Institute for Sustainable  
Development (IRD)

*The Noumea Biodiversity in Oceania workshops were held on the 24<sup>th</sup> and 25<sup>th</sup> of June 2019, just a few weeks after the 7<sup>th</sup> Session of the Plenary of the Intergovernmental Platform for Biodiversity and Ecosystem Services (IPBES) endorsed the first Global Assessment Report on Biodiversity and Ecosystem Services, not simply because of timing requirements but rather as a deliberate choice by its organisers, i.e. the Pacific Community (SPC), Pacific Regional Environment Programme (SPREP), Government of New Caledonia as SPC Conference Chair, New Caledonia research and innovation consortium (CRESICA), French Polynesia research, higher education and innovation (RESIPOL) and the French National Research Institute for Sustainable Development (IRD). The Pacific Islands are, in fact, one of the epicentres of the global biodiversity crisis, as already emphasised in the IPBES' latest report on the Asia-Pacific region, a crisis that has hit them hard even though their share of the responsibility for it is comparatively very small.*

Scientific research is vital for gaining a better grasp of core biodiversity issues as it can improve our understanding of how ecosystems operate, their interactions with human activities, and what their future might be. In spite of the important processes and events underway in the Pacific, the scientific resources put to work there are unevenly distributed and have proven to be too limited in several island groups, highlighting a pressing need for local and international scientific communities to step up their efforts to expand learning in the region. By their unprecedented scope and unique approach, the expert consultations that took place in Noumea during the workshops covered in this report marked an important milestone in reviewing existing knowledge about Pacific Island biodiversity, identifying future priority research areas, and outlining evidence-based recommendations to protect that biodiversity.

The papers included in this compilation allow readers to learn about and clearly understand the species richness of Pacific biodiversity and the key ecosystem services it provides in this part of the world. They also

give a glimpse into the many medium- and long-term consequences of the reckless exploitation of nature in marine and island environments that are particularly vulnerable to the global environmental and social changes affecting our planet. Habitat degradation, endangered species and declining resources, together with climate change and its wide-ranging impacts, are already having serious repercussions in the Pacific with its thousands of relatively small islands and are seen and experienced in a very real way by its communities. The rich cultures of Pacific peoples and their understanding of the natural world also provide a good opportunity to bring together traditional knowledge and cutting-edge research. Several of the research projects discussed in this report are, in fact, examples of “participatory science” with programmes that have been jointly designed by scientists and the communities directly involved through a demanding dialogue process. All are aimed at enhancing science’s contribution to the 17 Sustainable Development Goals (SDG) unanimously adopted by United Nations member States for 2030 and furthering developing

the cross-disciplinary field of sustainability science, whose first world congress will be held in Brisbane, Australia in June 2020 at the initiative of Future Earth and the Belmont Forum.

Another distinctive feature of the Noumea workshops was that, at the request of SPC and its member countries and SPREP, they were expressly designed to meet the goal of creating an interface between science and politics. This did, in fact, involve developing a Pacific programme and roadmap by setting out the specific responsibilities of researchers and inviting them, in particular, to highlight the region's many distinctive features in terms of the marine and land biodiversity crisis, while urging them to go beyond a simple warning phase. By combining multidisciplinary knowledge and looking more deeply into the various aspects of biodiversity, its uses and protection in the region, the specialists gathered in Noumea opened paths to be explored that will help place public policies in the various Pacific Island countries and territories on objective and scientific bases - policies that will be fit for responding to the urgent need to promote biodiversity and a more equitable world.

It will be up to governments and political decision-makers as well as to private-sector and civil-society stakeholders to take on knowledge and solutions arising from research in order to transform them into tangible actions designed to firmly commit the Pacific Islands to sustainable human development pathways. There will be

many opportunities to do so over the months and years that follow publication of this report, beginning with the annual SPREP meeting in Apia and the United Nations General Assembly focussing on its initial four-year SDG assessment, both of which will take place in September 2019. Those meetings will be followed by the France-Oceania Summit planned for French Polynesia, the 10<sup>th</sup> Pacific Island Conference on Nature Conservation and Protected Areas in New Caledonia in spring 2020, and the IUCN World Conservation Congress in Marseille, France in June 2020. This series of international events should culminate with the 15<sup>th</sup> Conference of the Parties (COP15) to the United Nations Convention on Biological Diversity (CBD) to be held in Kunming, China in autumn 2020. The last conference (COP 14 in Sharm El Sheikh, Egypt) helped assemble the myriad of existing biodiversity-related initiatives, initiate new coalitions, create new political dynamics, and exert greater pressure in order to achieve an ambitious multilateral agreement in Kunming. This is all the more important since the 20 Aichi targets, which have served as the strategic reference framework for international efforts to protect biological diversity during the 2010-2020 period, will then come to an end. In the Pacific, as in the rest of the world, implementation of those goals has been seriously delayed and trends in the wrong direction – unprecedented in the history of our planet – have not been curbed. Collective action is urgently needed, as the Pacific biodiversity is the priceless heritage of not only its own communities but of all of humanity.



Private collection ©I. Staron-Tutugoro.



## EXCERPTS FROM INTRODUCTORY SPEECHES

[...] there is a powerful bond between Pacific Island peoples, their land, biodiversity, and the Pacific Ocean that surrounds us. This bond is simultaneously symbolic, cultural, historical, and, at its heart, it illustrates what it means to be a citizen of this part of the World.

[...] We will have many opportunities over the coming months to place the Pacific region's biodiversity at the forefront of international action for our Planet. We must make the most of these opportunities to demonstrate just how strong the synergies are between climate, biodiversity, and ocean processes, together with achieving the Sustainable Development Goals. Sustainable development must include both human and environmental development in a holistic and as harmonious as possible approach that facilitates preservation, when preservation is required, sustainable use, when use is required and, above all, that ensures that Humankind coexists with the environment more intelligently than we have over the course of the past 50 years.

[...] On the basis of the knowledge that exists and the scientific and technical recommendation that have been made, it is impossible, even for the most skeptical, to deny that we must act. The recommendations that will flow from this workshop must be practically designed, focused, and worded so they can be understood by non-scientists and by decision-makers.

Cameron Diver,  
Deputy Director-General, SPC,  
Noumea, New Caledonia

[...] Our approach is firmly focused on strengthening regional and international partnerships, particularly within the framework of the Pacific Island Universities Research Network (PIURN), notably the University of New Caledonia, with which we have recently submitted a joint project for a University Research School. This URS project proposes new avenues for training tomorrow's Oceanian executives, and, in particular, training programs focused on the theme of biodiversity.

[...] Consolidating an inventory of available knowledge, taking into account feedback from everyone, identifying new avenues for research, or laying the foundations for a joint working methodology to progress together in a coordinated and multidisciplinary manner are all challenges to which these workshops will, I hope, contribute.

Professor Nabila Gaertner-Mazouni,  
Vice-President of Research council at the UPF,  
representative of RESIPOL

[...] The challenge here is to provide a regional coverage of Oceania. These workshops aim to shed light on the region's specificities in terms of biodiversity crisis, challenges, and solutions. We must bring Oceania back into the international biodiversity arena. Oceania, which represents 40 million people, is included in the Asia-Pacific regional chapter of the IPBES (4 billion inhabitants) [...].

[...] The global biodiversity crisis is severely affecting the islands of Oceania, which are particularly vulnerable to the consequences of Global Change (warming, flooding, invasions). While the region itself contributes little to the issues or even mitigates them significantly, the Oceanian Territories are strongly affected by them.

[...] We are an element of nature; Man is not the master but an element of the world. We are on the land of our ancestors, and we must respect it. I will conclude by quoting J. M. Tjibaou (1980): "We are part of the world, the world of the living, the world of nature, the world of the trees and plants, etc. They must be respected".

Dr. Valérie Verdier,  
Director of the ECOBIO Department,  
on behalf of the President and CEO of IRD,  
Professor Jean-Paul Moatti



[...] Unfortunately, although the biodiversity crisis was spotlighted in Paris, it is still insufficiently taken into account in Oceania. I hope that the organization of this follow-up event will draw some of the light from the Parisian spotlight to our territories, which are so fragile in the face of the biodiversity crisis described in France last May.

[...] Let us not make yet another conference to raise the alarm for an umpteenth time. Let us develop a systemic, pragmatic, scientific, and global approach in addressing the issue of threats to biodiversity. In the face of these challenges, I am convinced that our salvation will be met largely through our research efforts. Research that must truly be free and address the real challenges of this biodiversity crisis, with the ambition not only to serve science but also to shed light on the fundamental societal choices to be made.

[...] The IPBES Paris report concludes that it is not too late to take action. So, let's remain optimistic. If the problem comes essentially, or even only from us, the solution is us.

Dr. Laurent L'Huillier,  
Director of IAC,  
Vice-President of CRESICA

[...] With what we know about the world of living in New Caledonia, we could fill a large book, but with everything that there is still to discover, you could certainly fill a library. Hopefully, this discovery work will not become impossible because of the threats faced by these living organisms. Some of the best-known, most visible and threatened species are dugongs, whales, and marine turtles.

[...] Whether on land or at sea, we are facing the eternal difficulty of finding the balance (of conciliation) between economic development and the preservation of natural environments.

[...] The message is alarming. New Caledonia is committed to protecting its ecosystems and turning its human and natural capital into an asset for environmentally friendly economic development. Environmental protection must now be at the heart of all human activity.

[...] I am confident that the work of your workshop today will lead to relevant conclusions as a follow-up to the work of the IPBES in assisting decision-making for the conservation of biological diversity in the Pacific Basin. I am sure that the synthesis of your work will be used by other organizations to promote the need for conservation of Oceania's biodiversity. I hope that this work will find its way into the minds of those responsible for public policy.

Thierry Lataste,  
High Commissioner  
of the French Republic in New Caledonia



Opening session. From left to right : E. Hnawia (IRD representative in New Caledonia), L. L'Huillier, N. Gaertner-Mazouni, T. Lataste, C. Diver, V. Verdier

# INTRODUCTION

## BIODIVERSITY IN OCEANIA: NATURAL, HUMAN, AND SCIENTIFIC CHALLENGES

Oceania is a vast region of the Pacific Ocean, with more than 25,000 islands spread across an area of nearly 43 million square kilometers. Known worldwide for its terrestrial and marine biodiversity, which includes many species found nowhere else on the planet, it has been and remains a formidable source of inspiration for science.

Since the 18<sup>th</sup> century, the Pacific Ocean was methodically explored by naturalists and scientists during the great expeditions around the world (notably those of James Cook and Louis-Antoine de Bougainville). From then on, Oceania has never stopped inspiring scientists who have produced many books and theories. One such example is the origin of atolls that Charles Darwin had the genius to guess, in 1835, without appropriate means and by merely climbing up the main mast of the H.M.S. Beagle while the ship was sailing across the Polynesian archipelago. His theory on the temporal evolution of coral reefs, based on the subsidence of oceanic volcanic islands, was later validated by the plate tectonics theory and is still taught today. It was also in Oceania, 120 years later, that Edward O. Wilson, studying the ants' communities of the Melanesian islands, had his first intuitions about the existence of a taxon cycle for the colonization of the islands. It was the first step in the theory of island biogeography that he developed and then formalized with Robert H. MacArthur in the late 1960s. Born in the Pacific, this theory is one of the key foundations of conservation biology and remains one of the major principles of scientific ecology.

Within this vast oceanic space, the islands of Oceania form a continuum between land and ocean. They are marked by a significant fragmentation of their territories, as well as a considerable environmental heterogeneity over very short distances, particularly in the high islands where the summits sometimes reach over 3,000 m in altitude. These characteristics, often linked to the altitude gradients encountered on the islands, have allowed the development of unique fauna and flora. The isolation and challenges faced by species to naturally colonize these insular habitats exacerbate this trend. As a result, Oceania is the last refuge of some relict species, including *Amborella trichopoda*, considered by botanists as the most basal taxon among flowering plants, a species nearly common in New Caledonia. Other emblematic and endemic Oceanian species include the kagu, *Rhynochetus jubatus*, endemic to New Caledonia and the last surviving member of his bird family, or the tuatara, *Sphenodon punctatus*, endemic to New Zealand and the only remaining species of the lineage from which the scaly reptiles (geckos, skinks, and snakes) originate. These

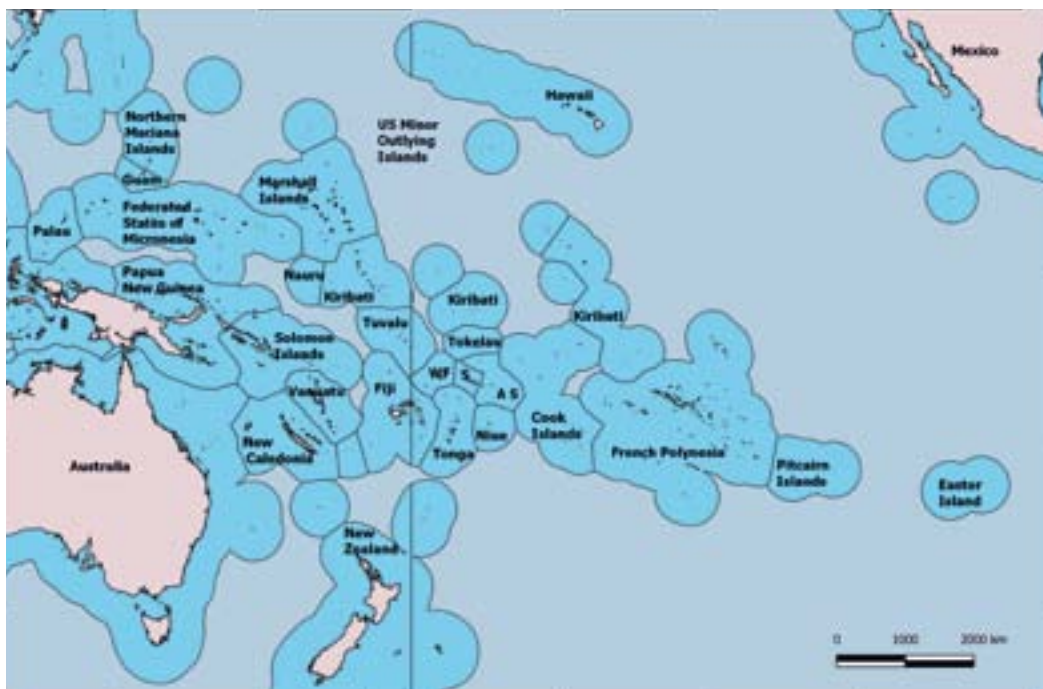
rare biological species result from millions of years of evolution and isolation and testify to the uniqueness of this region, but also its fragility. It is particularly true in terms of human pressures on nature, which today often exceed thresholds compatible with the sustainable maintenance of biodiversity.

Indeed, Oceania is also the continent of biological extinctions. For instance, over 1,200 species of birds have disappeared over the last three millennia as a result of the colonization of Man in the region. According to IUCN, Oceania also has the highest rate of endangered species in the world. Several of them are already considered extinct like the Guam rail (*Hypotaenidia owstoni*), a bird that owes its decline and partial extinction to the pressure exerted by introduced predators (snakes, stray cats, rodents). However, these significant transformations often seem to take place with relative indifference as a large part of this biodiversity is often invisible and not emblematic. Examples include arboreal snails of the genus *Partula* (over 120 species, at least 55 of which are extinct), apterous weevils of the genus *Rhyncogonus* known to occur throughout Polynesia (nearly 100 species distributed between Tonga and Hawaii), or flowering plants of the genus *Psychotria* (Rubiaceae family) extending as far as eastern Polynesia (> 215 species including 59 in New Caledonia). This situation can be even more extreme, as on the island of Rapa, which covers an area of barely 40 km<sup>2</sup> and is home to 99 endemic snail species, 67 endemic weevils, 68 endemic butterflies, and at least 67 endemic flowering plant species.



Ceremonial preparation of kava in Santo Island, Vanuatu, one of the most important plants in the rituals of a large part of Oceania © IRD/H. Jourdan.





Map of Oceania showing national EEZ boundaries ©IRD/L. André.

In Oceania, most populations still live in a physical and spiritual “symbiosis” with Nature, of which they consider themselves an integral part. Oceania is also unique for its significant linguistic and cultural diversity that belongs to one large entity and corresponds to various understandings of the world, particularly of biodiversity, the environment, and its management. Cultural diversity and biodiversity are closely linked in this region of the world and involve particular challenges. Most of the Oceanian island landscapes have been shaped jointly by humans and Nature for millennia. The occupation and use systems of the so-called “traditional” territories have favored the maintenance of some of the biodiversity and allowed the island populations to live on these diverse natural resources despite the sometimes substantial environmental constraints.

However, human pressures on biodiversity are increasing daily and have changed over time. Habitat loss, degradation and fragmentation could exceed irreversible thresholds, challenging the resilience of many species and some ecosystems. These risks are exacerbated by the acceleration of trade fluxes and human migrations that lead species to move and increase the risks associated with these movements, including the replacement of native species by invasive alien species.

In a changing world, that Man has globally transformed, and an era described as Anthropocene, knowing about the threshold of impacts is of critical importance to better understand the capacities of modified environments and the consequences of the decline of living communities on ecological functions, particularly in unknown neo-ecosystems. In this context, it is our

collective responsibility to ensure the sustainability of living heritage and to allow evolution to continue. However, this global heritage imperative creates a tension that is difficult to overcome: on the one hand, it is necessary to conserve species and areas whose rarity and uniqueness justify the attention they are currently receiving; on the other hand, local societies can legitimately choose to be part of a process of development and resource exploitation.

So, what can we do? In its chapter dedicated to the Asia-Pacific region, the IPBES<sup>1</sup> Expert Committee delivered its first global assessment of biodiversity and ecosystem services during the 7<sup>th</sup> Plenary Conference in Paris. The conclusions are clear: the decline in biodiversity is unprecedented and alarming. This global report also presents a new perspective and emphasizes the importance of indigenous and local knowledge in the protection and sustainable management of Nature.

It is not too late to take action. In response to the critical biodiversity challenges faced by island States and communities and as a follow-up to this 7<sup>th</sup> IPBES Plenary, the Pacific Community (SPC), the Secretariat of the Pacific Regional Environment Programme (SPREP), the Government of New Caledonia, in its capacity as Chair of the SPC Conference, the Consortium for Research, Higher Education and Innovation in New Caledonia (CRESICA), the Consortium for Research, Higher Education and Innovation in French Polynesia (RESIPOL), and the French National Research Institute for Sustainable Development (IRD) have joined forces to organize the regional event “Biodiversity in Oceania” in Noumea.

<sup>1</sup> The Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) was created in 2012 and now has 129 Member States. Its 7<sup>th</sup> Plenary Conference was convened in Paris from the 29<sup>th</sup> of April to the 4<sup>th</sup> of May 2019 and its main target was to establish the first global assessment of biodiversity and ecosystem services to serve as a reference for the development of the future global framework for biodiversity post-2020.

This event took place on the 24<sup>th</sup> and 25<sup>th</sup> of June 2019 and mobilized the scientific community of Oceania as well as stakeholders in charge of development around the challenges of terrestrial and marine biodiversity. Eighty experts were convened from Australia, New Caledonia, Vanuatu, New Zealand, Fiji, Wallis and Futuna, Samoa, French Polynesia, Canada, and France. Based on workshops and scientific discussions, this event raised awareness of the IPBES approach in the region and drew attention to several significant local issues related to biodiversity and ecosystem services that are specific to the Pacific Ocean.

The interactions mainly focused on three themes during three dedicated workshops: (i) Protected and managed terrestrial and marine areas; (ii) Biodiversity, ecosystem services and socio-economic activities using natural resources; (iii) Biodiversity, endogenous and customary law, and traditional knowledge. In addition to the experts who attended the workshops, the plenary session brought together 70 other participants, mainly members of associations, NGOs, local authorities, and consultancies.

The synthesis report, published here, transcribes in a condensed and simplified form the main highlights and key elements of these two intense days of work, exchanges, and discussions. It is intended primarily for Oceania's decision-makers. Its publication, only a few weeks after the completion of the workshops, testifies to the ambition of the experts to give as much visibility as possible to the specific features of the biodiversity crisis in Oceania and to echo, in the months and years to come, the voices of Oceania in international arenas dedicated to biodiversity and ecosystem services.

We hope that the reader will endorse the authors' conviction that protecting and managing biodiversity in Oceania cannot be achieved without taking into account the various forms of knowledge, practices and uses. At the same time, however, it is also important to carry out further research to keep building and deepening our understanding of biodiversity and the specific way in which the environment is understood and managed in Oceania.

The only way to maintain the relationship between Humankind, the Earth and the Ocean within this vast space in the heart of the Pacific is through these intertwined perspectives and their consideration in future decisions and public policies. Protecting biodiversity in Oceania is about safeguarding an essential chapter of the great book of human life and history.



*Plenary session, Noumea, 25<sup>th</sup> of June 2019 © IRD/N. Petit.*











## Part 1

# BIODIVERSITY, ECOSYSTEM SERVICES AND SOCIO-ECONOMIC ACTIVITIES USING NATURAL RESOURCES

Why is Oceania's biodiversity so unique and therefore so remarkable? How severely is it affected by the global biodiversity crisis and the deleterious consequences of various human activities? What are the relationships between the peoples of Oceania and nature, and how can traditional knowledge complement scientific knowledge? These were the main questions that guided the discussions of this workshop, focused on marine ecosystems, on the one hand, and terrestrial and freshwater ecosystems, on the other. More than 50 experts diagnosed the current state of biodiversity and the various pressures it faces in order to propose specific solutions and recommendations.

# AN EXCEPTIONAL NATURAL AND CULTURAL HERITAGE

*From the deep valleys of the Marquesas Archipelago to Australia’s Great Barrier Reef, through the high forests of Papua New Guinea or the Mariana Trench, Oceania has many original habitats, sometimes unexplored, sometimes extreme. Throughout the history of this region, these have been remarkable places for the development of biological and cultural diversity.*

**Key message 1 – Oceania is a region of high biodiversity and ecological functions that originate from a unique geological and evolutionary history**

With its 8.5 million km<sup>2</sup> of land and a maritime area of 30.5 million km<sup>2</sup>, Oceania is a vast group of archipelagos, united by a large ocean, both vital and nourishing. Its 25,000 islands have various origins including continental, oceanic, volcanic and coral islands (atolls). Isolation, sometimes ancient (more than 2.5 billion years for Australia, 500 million years for New Zealand, and 37 million years for New Caledonia) has allowed the emergence of incredibly diverse and often unique forms of life. Endemic and even micro-endemic species are the most significant evidence of the perfect adaptation of life to these isolated and unparalleled habitats.

**A global reservoir of terrestrial endemic species**

The terrestrial biodiversity of Oceania is known world-wide for its species richness and particularly for its endemic species (which are found nowhere else). Flowering plants, birds, reptiles, terrestrial mollusks, and insects show particularly high rates of endemism, sometimes reaching 75% to 100%, making the islands of Oceania exceptional “biodiversity hotspots” of universal value.

**The highest concentration of marine biodiversity in the world**

On the marine side, Oceania holds many records. Its islands are home to nearly a quarter of the world’s reefs, atolls and lagoons. Their morphological and functional diversity is remarkable. The largest diversity of reef formations, accounting for more than 150 different types, is found in Fiji, Papua New Guinea, and New Caledonia. The Tuamotu Archipelago in French Polynesia is the largest atoll archipelago in the world with 77 atolls. The two longest continuous coral barrier reefs are in New Caledonia (1,600 km) and Australia (2,300 km). Oceania also harbors three of the four deepest oceanic trenches in the world (the Mariana Trench at -11,000 m, the Kermadec Trench at -10,500 m, and the Philippine Trench at -10,300 m) as well as several thousand seamounts. The rate of marine endemism, which is lower than on land, varies from 2% to 10% depending on the taxonomic group and region. Finally, although the coral and coastal ecosystems represent only 1% of the world’s surface area, they host the highest concentration of marine biodiversity.

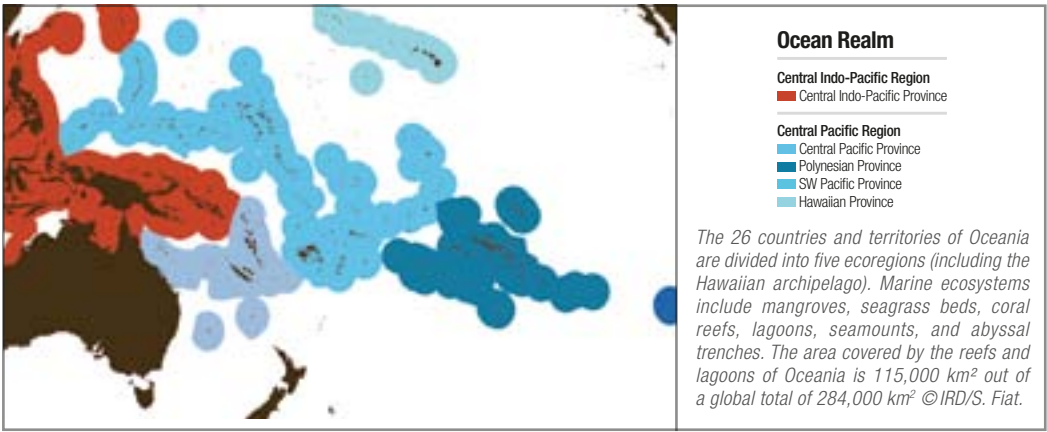
**30,000**

This is the number of plant species currently recorded in Oceania. Rates of endemism can reach 75% in some countries and almost 90% depending on the ecosystem (e.g., mining shrublands). There are an estimated 3,000 species of terrestrial vertebrates.



1. The pigeon *Ducula galeata*, an endemic species of the Marquesas Archipelago, status endangered (EN) © J-Y Meyer — 2. The dugong *Dugong dugon*, Noumea, New Caledonia © IRD/S. Andréfouët — 3. Rairoa Atoll, Tuamotu Archipelago, French Polynesia © IRD/S. Andréfouët — 4. The koala *Phascolarctos cinereus*, a tree marsupial endemic to Australia © E. Vidal — 5. *Amborella trichopoda* belongs to the oldest lineage of flowering plants © IAC/G. Gâteblé — 6. The tuatara or *Sphenodon punctatus*, endemic to New Zealand, Hen and Chicken Islands, the only representative of the order Rhynchocephalia © J. Gardiner.





## Key message 2 – The knowledge of Oceania’s biodiversity is currently incomplete, fragmented and unevenly distributed. It exists in part in the form of traditional knowledge

There is currently no comprehensive census of marine biodiversity for Oceania. Available figures are still incomplete and tend to represent mainly fish, corals and commercial invertebrates. Inventories of the major biological groups are only available for a few regions with 15,000 species recorded in New Caledonia and 3,000 species in the Marianas Islands and French Polynesia. The central Pacific island states remain the most poorly known.

Data are also scattered according to groups for the terrestrial fauna, flora and fungi. For example, a total of 9,550 terrestrial species have been recorded in New Caledonia, 498 species of terrestrial gastropods are known to be endemic to French Polynesia and 240 species of marsupials live in Australia.

However, these figures only offer a partial view of reality, because inventories tend to focus on specific biological groups such as corals, fish, birds, or species of commercial interest. Many others are still neglected, including insects and algae, although they play important roles in ecosystems and are sometimes very diverse. In addition, knowledge density varies from country to country, depending on research and data collection capacities. Local traditional knowledge could be used as a basis for developing more effective inventory and conservation strategies. Lastly, advances in genetics are disrupting the current scientific knowledge of living organisms and calling into question many of the previously accepted fundamentals.

## Back to the future

Scientists have discovered remarkable ecosystems in some areas of the South Pacific, including Papua New Guinea, New Caledonia, and Palau, where current environmental conditions are close to the scenarios projected by climate experts for the next 50 years (low pH and/or high CO<sub>2</sub> levels and/or warmer water temperatures, etc.). These sites are of particular interest because they harbor coral communities that live in these sub-optimal and peculiar living conditions. They represent natural laboratories and exceptional opportunities to better understand the adaptive mechanisms that corals could develop in response to climate change in the future.



*CO<sub>2</sub> bubbles out of intense volcanic vents in the reef, Ambitle region, Papua New Guinea. They provide natural conditions for studying the effect of ocean acidification on the physiology of coral ©IRD/J-M. Boré.*



*Coral communities (more than 50 species of corals) associated with the mangrove of Bouraké, New Caledonia. They are exposed to pH, oxygen, and temperature values close to those expected in 2050. This site is a natural laboratory providing the ideal conditions to study the effect of climate change on corals © IRD/S. Andréfouët.*

A unique global reservoir of genetic resources for food, essential for the survival of mankind

Key message 3 – The diversity of traditional Oceanian practices makes it possible to maintain a remarkable agrobiodiversity

The rich and abundant evolutionary history of the Pacific Island's living organisms has been connected for 6,000 years with that of the various waves of migration and human settlements. These movements have disrupted the pre-existing biological dynamics. In ancient times, navigator-farmers from Asia colonized the Oceanian archipelagos one by one, including the most isolated, and disseminated plants (food, medicinal or ornamental) as well as domesticated and commensal animals (hens, pigs, dogs, rats). To ensure the food self-sufficiency of human island communities, these plants have been cultivated, sometimes for several millennia, in isolated and constrained systems and according to a variety of traditional practices. These species of interest now form a remarkable agrobiodiversity.

This agrobiodiversity encompasses not only the diversity of plant and animal genetic resources used in agriculture or farming but also soil organisms, insects (pollinators, auxiliaries, etc.) and any other species present in these traditional agricultural systems. It also includes the diversity of organisms found in natural and semi-natural habitats linked to food production.



1. Giant swamp taro garden with coconuts, bananas, and betle nut, Koror Island, Palau © R. Thaman – 2. Yam harvest, Gohapin Tribe, New Caledonia © IAC/N. Petit.

CePaCT, a valuable bank of resources

The Centre for Pacific Crops and Trees (CePaCT), located in Fiji and managed by the Pacific Community (SPC), hosts the only *in vitro* gene and seedling bank in the Pacific region, as well as a wide range of cultivated species. Between 2004 and 2017, the CePaCT disseminated about 22,000 seedlings in the region and around the world.

*I learned a lot from the people of Oceania. Indigenous peoples hold traditional knowledge, linked to ancestral observations and uses, which is often more detailed than scientific knowledge. This knowledge is transmitted orally by the elders and is, unfortunately, being lost. It is becoming urgent to collect this knowledge, ethically and in accordance with customs, in order*



© IRD/N. Petit.

*to teach young people how to identify species. This is the principle of “Name it or lose it”!*

Pr. Randy Thaman,  
The University of  
the South Pacific, Fiji



The New Caledonia herbarium, managed by the IRD in Noumea, houses a representative collection of the flora of New Caledonia and many specimens from the Pacific region. It currently includes approximately 85,000 specimens © IRD/D. Bruy.

**Key message 4 – The lifestyle of Oceanian populations is closely dependent on natural resources**

Isolated and scattered across the world's largest ocean, Oceanian populations have forged close dependencies on nature over time. Consequently, the accelerated erosion of biodiversity and the dysfunctions caused to ecosystems are gradually depriving Oceanian populations of basic goods and services. Coastal and lagoon ecosystems (mangroves, seagrass meadows, algae beds) represent important biodiversity issues for the eight million islanders who directly depend on them. These natural environments are both a vital source of food and the cornerstone of their social, cultural and spiritual identity.

**The Aborigines of Australia and the first inhabitants of present-day Papua New Guinea** have colonized their lands for more than 50,000 years. Unrestricted by the space available, unlike most other Oceanian peoples, they were essentially nomadic hunter-gatherers. Nevertheless, they developed agriculture 15,000 and 7,000 years ago, respectively, independently of other regions (Middle East, China, Mesoamerica). In addition, genetic studies have shown that Papua New Guinea has been an important dissemination source of certain food plants for the South Pacific. This is, for example, the case for plantain bananas.



**1.** Oceania hosts 30 UNESCO World Heritage Sites, two-thirds of which are natural sites. Upi Bay, the Isle of Pines ©Province Sud/M. Dosdane – **2.** The Marae Taputapuātea in Ra'iata Island, French Polynesia © GIE Océanide/J.-B. Herrenschrnmidt.



# A REGION UNDER PRESSURE

*Endemic species and island ecosystems have developed a fragile equilibrium that is particularly sensitive to the rapid external changes and stresses associated with human activities. Despite its isolation and a relatively small human population (40 million people), Oceania is not immune to the biodiversity crisis...*

## Key message 5 – Oceania is at the center of the biodiversity crisis and its associated dysfunction of ecosystem services

As in the rest of the world, in Oceania, terrestrial, marine and freshwater ecosystems are under increasing pressure and face threats of anthropogenic origin. Some are internal (local), but external pressures are also a large part.

**Internal pressures** are related to the past or current practices of Oceanians. They include deforestation, fires, urbanization, the construction of infrastructure and transport networks, the unsustainable local use of certain natural resources, various forms of pollution linked to imperfect waste management, etc.

**External pressures** come from the outside and they are constantly increasing. These include invasive introduced species, the overexploitation of natural and mining resources, pollution, mass tourism and, finally, the effects of climate change (changing rainfall patterns, increasing ocean temperature and acidification, sea-level rise, coral bleaching, emerging coral diseases, and the explosion of predator populations such as the sea star *Acanthaster*). Island environments are much more vulnerable to external pressures, that negatively affect biodiversity than continental environments.

Local and global changes are currently generating and will continue to generate major disruptions, the impacts of which on ecosystem functioning and structure are still poorly understood. These pressures lead to the degradation of natural habitats and an increasingly rapid decline in biodiversity and species abundance. The most vulnerable species are becoming scarcer and the risk of extinction is increasing. This is the case for the New Caledonian population of dugong. Disruptions and disequilibria can, on the other hand, lead to blooms of certain species that can generate shifts in natural communities and landscapes.

## 75%

of the animal species that have disappeared from the planet were island species. For birds, this figure reaches 90%. It is estimated that more than 1,000 species of land birds have become extinct in the islands of Oceania since their colonization by humans, representing over 10% of the world's avifauna.

*An organism that has evolved over thousands or even millions of years in a particular place is a heritage, an ecological value. It is difficult to imagine that in a few decades, a heritage of several million years could be cleared away. We must also keep in mind that when a species disappears, there is no substitution possible. This is irreversible and the interactions that this species had established with other species are also disappearing, with sometimes dramatic consequences for other species as well as for humankind.*



@IRD/N. Petit.

Philippe Grandcolas,  
Research Director  
at the CNRS, Paris



Fully bleached branching coral community, Roche Blanche, South Lagoon, New Caledonia ©IRD/F. Benzioni.

## 50%

of Australia's live coral barrier reef coverage "disappeared" between 1985 and 2012 as a result of bleaching episodes, cyclones and *Acanthaster* outbreaks. This was followed by the disappearance of an additional 30% during the 2016 heat wave. Elsewhere, the situation is less alarming with a stable living coral cover over several decades. However, the most vulnerable species are being replaced by more resistant species, leading to a decrease in biodiversity.



Lake Lalolalo, Wallis Island. Many islands have fragile freshwater reserves, threatened by a risk of chemical (hazardous waste) and saline (rising water) pollution and overexploitation © IRD/T. Berr.

### Key message 6 – Habitat loss, land and sea use changes and biological invasions are the greatest threats to biodiversity and ecosystem services in Oceania

The IPBES plenary session of April 2019 reclassified the most significant factors affecting nature globally by their order of importance<sup>1</sup>, but this ranking differs for Oceania. The destruction of natural environments and the introduction of invasive species are the two main drivers of biodiversity erosion in island ecosystems: biodiversity loss and the resulting cascading degradation modify the functioning of ecosystems and alter ecological services that are useful to wildlife and flora, as well as human populations. The consequences for the latter are numerous: difficult access to resources (food, water, raw materials), reduced soil fertility (and therefore agricultural yields), increased agricultural pests, lower resistance to disease, soil erosion, floods, economic and cultural losses, etc.



Pastures for extensive livestock farming, New Caledonia © IAC/T. Hue.

### Freshwater, a vital resource

Rivers, lakes and other wetlands are important social environments in the Pacific because they are areas that provide ecological services and are a source of well-being for people. Little is known about the biodiversity of these ecosystems. The construction of artificial reservoirs to supply inhabited and tourist areas dries up rivers and prevents the migration of certain species while favoring mosquito populations, which are potential vectors for pathogens. Soil pollution and biological invasions are other major threats. The conservation priority is to protect forest areas in watersheds and to work with indigenous peoples and their ancestral management knowledge.

### Six global biodiversity hotspots

Oceania is home to six of the 36 biodiversity hotspots identified worldwide. These are southwestern Australia, the forests of eastern Australia, and the islands of eastern Melanesia, New Caledonia, New Zealand, and Polynesia-Micronesia. Global biodiversity hotspots are areas where the very rich biodiversity is particularly threatened by human activities. These sites are key targets in global management and conservation strategies. The large number of hotspots in Oceania testifies to its exceptional biodiversity, but also to its high vulnerability.



The capture of a Pacific rat, *Rattus exulans*, a high-impact invasive species © IRD/CNRS/T. Vergoz.

<sup>1</sup>Land and sea use changes; the direct exploitation of certain organisms; climate change; pollution and toxic and invasive species.

**Offshore fishing: declining stocks**

The significant increase in the industrial fishing pressure exerted by the major fishing countries, most of which are not located in the area, is weighing heavily on the sustainability of the shared stocks. This is particularly the case for tuna resources, for which the competition between industrial and artisanal fishermen is increasingly strong, depriving island communities of the full benefit of their coastal waters. At a smaller scale, coral ecosystems also suffer the harmful effects of sometimes poorly controlled fishing, in addition to the negative effects of indirect pressures such as the anthropization of coastal areas (development, pollution, etc.) or further upstream in catchments (deforestation, soil erosion, etc.).

**Small coastal fisheries: resources are becoming scarce**

Oceanian coastal populations are highly dependent on marine resources. Subsistence fishing is estimated to account for about 70% of coastal fish catches. This informal, opportunistic exploitation, which is still very difficult to quantify, involves many organisms such as fish, mollusks, crustaceans, and echinoderms. Several hundred species have traditionally been exploited. The increasing scarcity of these resources, linked in particular to rising anthropogenic impacts on coastal ecosystems, calls for the development of management strategies adapted to the regional context. This approach is currently made particularly difficult by a lack of fundamental knowledge about the biology and ecology of the targeted resources.



*The increasingly systematic use of offshore fish aggregating devices (FADs) is making a significant contribution to the depletion of fish stocks  
© IRD / M. Taquet.*



*Cast-net fishing, a technique widely used in Oceania ©P.-A. Pantz*

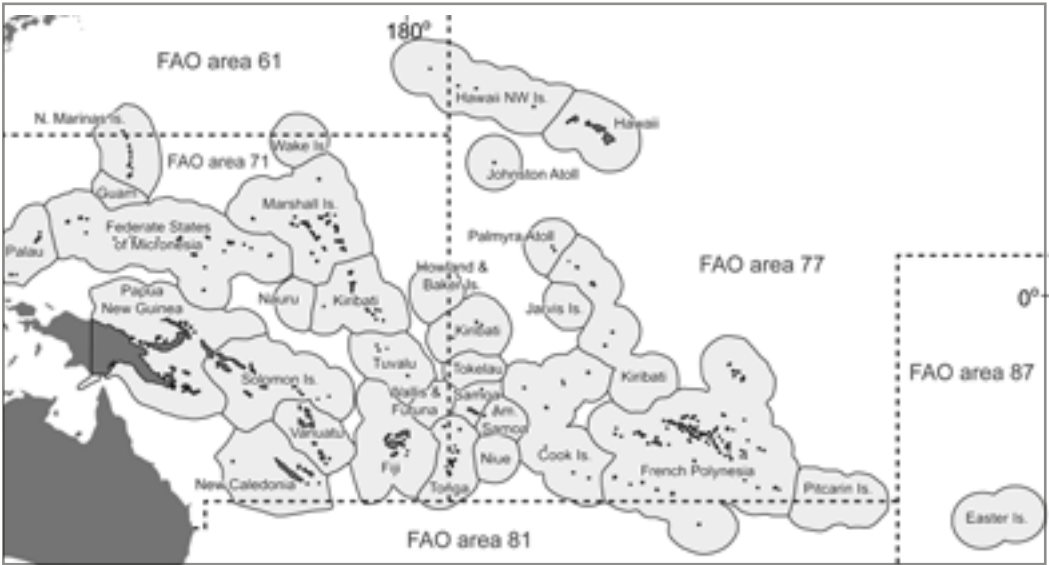


*The fishing catches of 25 Pacific Island Countries, States and Territories have doubled in half a century, from 110,000 tons per year in 1950 to over 250,000 tons per year in 2000, and declined to about 200,000 tons per year in 2010. These catches include artisanal fisheries (small commercial and subsidized, undervalued), industrial fishing and recreational fishing. According to known data, artisanal fishing accounted for 25% of the catches in 2010, but the latest data show that this activity was divided by two over the last two decades, with catches decreasing from 97,000 t/year in 1992 to less than 50,000 t/year in 2010. This fishery is essentially a non-commercial subsistence fishery. In my view, marine resource management agencies throughout the Pacific need to be aware of the importance of their reefs and/or inshore fisheries for the food security of their populations, particularly in rural areas. Nowadays, these resources cannot be managed unless their current level of exploitation is properly known.*

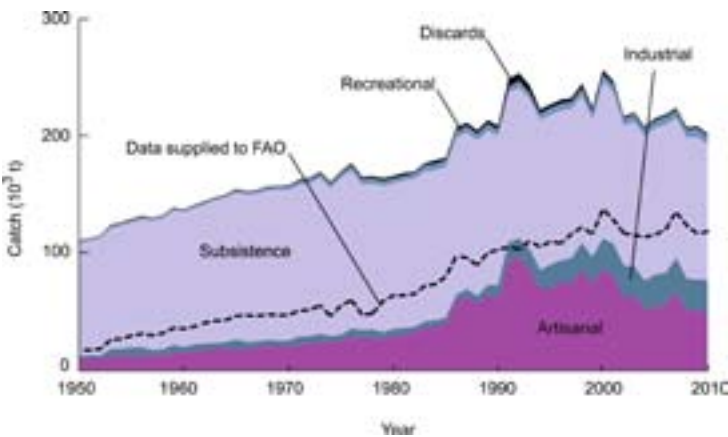


@IRD/M. Vilayleck.

Pr. Daniel Pauly, The University of British Columbia, Institute for the Ocean and Fisheries, Canada, Director of Sea Around Us



The Sea Around Us research group performed fisheries catch reconstruction studies for 25 Pacific island countries, states, and territories. Source: Zeller et al. (2015) and [www.seaaroundus.org](http://www.seaaroundus.org).



Total catches increased from 110,000 t/year in 1950 (of which 17,400 tons were reported) to a peak of over 250,000 t/year in 2000, before declining to around 200,000 t/year by 2010. This decrease is driven by a declining artisanal (small-scale commercial) catches, which was not compensated for by increasing domestic industrial (large-scale commercial) catches. The artisanal fisheries appear to be declining from a peak of 97,000 t/year in 1992 to less than 50,000 t/year by 2010. Source: Zeller et al. (2015) and [www.seaaroundus.org](http://www.seaaroundus.org).

# IT IS NOT TOO LATE TO TAKE ACTION

*The islands and maritime areas of Oceania are, in many ways, at the forefront of the upheavals affecting the planet. Due to their vulnerability and rapid response, they represent critical “sentinel ecosystems” for the international community. They are also incredible natural laboratories and ideal places to develop and test new solutions. Faced with this potential and the major challenges of global change, the workshop experts proposed a series of solutions and recommendations.*

**Key message 7 – Nature can be better preserved, better protected and used in a more sustainable way**

The conservation of these remarkable terrestrial and marine ecosystems, their biodiversity and associated ecosystem services, as well as the sustainable management of habitats and natural resources, have become critical issues in the Pacific. Maintaining this unique and original biodiversity and the resilience of the various ecosystems requires:

- Protecting natural areas of high heritage or ecological value that also provide vital ecosystem services. For example, coastal areas, dry forests, humid forests, scrublands, subalpine vegetation, mangroves, sea-grass meadows, coral reefs, etc.
- Restoring or rehabilitating degraded or invaded natural habitats.
- Protecting the most threatened endemic species.
- Maintaining and preserving the genetic diversity of cultivated plants.
- Better managing of coastal fisheries.
- Developing organic and sustainable agriculture.
- Safeguarding traditional knowledge.



Science festival with high school students, Wallis Island © IRD/T. Berr



Surveys on traditional varieties of kanak cabbage, Lifou Island, New Caledonia © IAC/N. Robert.

## Key message 8 – Knowledge needs to be improved, better shared and more widely disseminated

The current knowledge of Oceania's biodiversity is incomplete, fragmented and unevenly distributed. To fill the gaps in current knowledge, the need to extend efforts to all areas is becoming urgent, as well as increasing research efforts in the most well-studied countries and sites. Despite the abundance of publications on Oceania, the island countries of the Central Pacific remain the least well-known in terms of their marine biodiversity and significant gaps remain for terrestrial ecosystems, particularly regarding the pressures they face. Several approaches are proposed for improvement:

- Increase knowledge about biodiversity (species, abundances, etc.) and the understanding of the fundamental roles of species, particularly key species, in the structuring, functioning, and dynamics of ecosystems.
- Better assess the vulnerability and resilience of ecosystems and populations to global change, but also assess more accurately the responses to the various disturbances, in particular in terms of tolerable carrying capacities and ecological tipping points.
- More accurately and comprehensively estimate and define the scientific, ethical, socio-economic and

cultural value of the habitats, ecosystems, and species they contain, taking into account indigenous traditional ecological knowledge and practices (e.g., for small-scale coastal fisheries or agroforestry).

- Establish synergies and complementarities between modern scientific knowledge and traditional knowledge to define and evaluate public policies for the conservation and management of biodiversity and ecosystem services in Oceania.
- Maintain, disseminate and share traditional and local taxonomic knowledge that is often transmitted orally: "Name it or lose it". Creating spaces for the exchange and sharing of knowledge would make it possible to combine modern and traditional knowledge, which are inseparable and complementary.
- Make knowledge accessible and more intelligible to as many people as possible and, to this end, ensure effective dissemination to decision-makers, the educational sector, and the general public. It is essential to integrate knowledge about biodiversity and ecosystem services into all public policy thinking.
- Promote the intergenerational transmission of knowledge and skills related to biodiversity and ecosystem services. It is also important to train and mentor the next generation of Oceanian experts.



Traditional weaving lesson, Opoa school, Ra'iatea Island, French Polynesia © GIE Oceanide/J.-B. Herrenschildt.



**Extensive ecological restoration:  
the case of the Vale NC program**

The Vale NC industrial complex, located in the south New Caledonia, includes a 1,900 hectares plant site for ore extraction and the production of nickel and cobalt. Vale NC is running a vast program to rehabilitate the operating environments, based on the activities of an industrial incubator set up in 2010. Each year, the central nursery, as well as satellite nurseries managed by neighboring tribes, produce 300,000 endemic plant species. Of the 400 endemic species of the mining scrubland, about 240 different endemic species are now produced using processes that have required many years of knowledge acquisition and technical development. To date, nearly 230 hectares have been replanted using more than 1.2 million seedlings.

**Key message 9 – We must work for greater ethical and scientific solidarity in Oceania**

For the experts, taking into account Oceania's biodiversity and associated ecosystem services requires strengthening the links between scientific disciplines, traditional and contemporary knowledge as well as establishing a global vision that is shared and accepted by all. To achieve this objective, they agreed to recommend the following actions:

- Increase local research capacities in infrastructure and personnel, particularly in small island developing states (SIDS), for example through support from scientific institutions in scientifically developed countries or territories of the Oceania region or other regions of the world.
- Conduct and secure long-term monitoring of biodiversity and ecosystem services through the establishment of shared observatories and databases and the construction of predictive models and “future scenarios” adapted to the relevant geographical scales in Oceania.
- Strengthen existing networks between researchers and academics (PIURN, CRESICA, RESIPOL) and develop close collaborations with regional agencies (e.g., SPREP), environmental and natural resource stakeholders, as well as with local, customary, administrative and even religious communities, and authorities.
- Promote access to and sharing of bioinformatic data (databases, genetic sequences, etc.) in compliance with the ethics and deontology that should govern this type of action.



Plant breeding at the Vale NC nursery for ecological restoration and revegetation programs © Lincks/E. Bonnet-Vidal.

- Co-construct research and conservation projects with stakeholders and local communities, collectively identifying relevant monitoring indicators and prioritizing actions.
- Involve all relevant actors and stakeholders during all phases of the research process, before, during and after assessments of ecosystem goods and services.
- Develop science programs on biodiversity and ecosystem services and incorporate them into all levels of education and training (primary, secondary, university, and professional training).

**Particular attention should be paid to the traditional knowledge held by Oceanian women as they are engaged in fishing (crabs, shellfish), agriculture or horticulture activities that are their own and represent important livelihoods.**



© IRD/N. Petit.

Pr. Gilles Bœuf,  
Sorbonne University,  
President of the French  
Biodiversity Agency



Workshop ©IRD/N. Petit.

**Coordinated by** J. -Y. Meyer, Y. Letourneur, C. E. Payri, M. Taquet, E. Vidal.

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**Editorial support by** E. Bonnet-Vidal.









## Part 2

### PROTECTED AND MANAGED TERRESTRIAL AND MARINE AREAS

As we are facing the urgency of safeguarding biodiversity, protected areas address the need to apply a precautionary principle (option value) to living things and their evolution at a global scale. In Oceania, for effective, socially and politically sustainable conservation of biodiversity, it is essential to reconcile the global agenda, designed to prevent the collapse of biodiversity, with the preservation of local lifestyles and the services that people get from biodiversity. Preserving biodiversity and ecosystem services using protected areas must consolidate Nature's contribution to the well-being of Oceanians.

# THE SPECIFIC FEATURES OF OCEANIAN PROTECTED AREAS

*A protected area is a planning and management tool that enables the coordination of conservation and resource management. If it is to be relevant, however, its purpose and the balance between protecting species and preserving ecosystem services must be clearly defined from the very beginning in consultation with local populations.*

**Key message 1 – In Oceania, the management structure and purposes of protected areas are highly diverse, and their effectiveness depends on many factors**

For a long time, Oceania’s protected areas have been conceived as places to manage local uses and practices, but they are increasingly becoming no-take reserves that are designed to protect habitats and biodiversity sustainably. Besides, we observe a recent and progressive semantic shift towards the notion of so-called “managed” areas. These “managed” areas designate a protected area combining the preservation of ecosystem services and natural resources that are closely associated with the lifestyles and cultural foundations of local island societies.

In practice, in the field, the management methods and purposes targeted by protected areas are diverse, and almost always plural: no-take reserves that “fully” protect an ecosystem, habitat, function, or species are rare. In many instances, the objective is also to maintain a “pantry”, (safeguard a customary social role), facilitate research, recognize territorial legitimacy, etc. Therefore, in Oceania, the pragmatic implementation of the boundaries and management methods of a protected area must include this diversity of purposes and interests of the different stakeholders.

Customary authorities are often central to management policies, particularly for protected areas located on customary territories. Depending on the cases and local capacities, whether inspired or not by traditional management modalities, management systems remain empirical. These systems do not always respond to growing threats, and their effectiveness depends heavily on social and customary organizations and demographic pressures.



Chief Assembly Institution, Port Vila ©IRD/H. Jourdan.



The Fjordland National Park, South Island, is the largest of the 14 national parks in New Zealand, with an area of 12,500 km<sup>2</sup> ©Lincks/E. Bonnet-Vidal.

**Key message 2 – The majority of Oceania’s protected areas are either small or very large**

In Oceania, small and very large protected areas co-occur, but those of medium size are rare. A fairly systematic concern is to try upscaling protected areas. Indeed, while small areas are valuable for the management of local resources, they are regarded as insufficient to achieve effective conservation of biodiversity and ecosystem functions. As a result, besides initiatives for the creation of large protected areas in Oceania that are strongly supported by large environmental NGOs, particularly in the marine environment, experimental and pragmatic dynamics are favoring other approaches. These include increasing the number of small protected areas, rather than creating large protected areas that are difficult to control, and managing them as networks to maintain the connection between protected areas (this is the strategy of the LMMA network, for example, see box). Another approach is to target ecologically coherent areas to take into account the expected future environmental changes. Experiments are being carried out to anticipate the effects of climate change. Some of the research plan to increase the size of small terrestrial protected areas to include high-altitude habitats and facilitate the movement/migration of species to these more favorable “refuges”.

## Examples of marine protected areas in Oceania

### The network of Locally

#### Managed Marine Areas (LMMAs):

The LMMa network is unique. It brings together local communities, customary authorities, state managers, environmental protection officers, scientists, and sponsors. LMMAs are marine areas managed by local communities according to shared diagnostic approaches and community-based adaptive management. They are adapted to the local context and based on traditional knowledge and practices while also taking into account scientific knowledge. These marine protected areas aim to conserve and manage local resources, and exchanges of experience between LMMa managers strengthen the capacities of the communities involved. This network includes more than 2,000 protected areas. In Fiji, for example, in the LMMAs, the communities themselves have established 465 no-fishing reserves.

#### XXL marine areas:

Since the 2000s, several NGOs and states have campaigned to establish very large marine protected areas. Examples include the creation of the Phoenix Islands Protected Area (PIPA), which covers 408,250 km<sup>2</sup>, and the Natural Park of the Coral Sea in New Caledonia, which extends over 1.3 million km<sup>2</sup>. These initiatives are often criticized for being poorly operational in terms of management and for establishing protected areas “on paper” that are unable to respond to the increasing number of Asian fishing fleets across the Pacific. However, they reflect the willingness of Pacific Sovereign States to take control of their EEZs and resources.

#### Marine protected areas listed as UNESCO World Heritage Sites or as Man & Biosphere (MAB) sites:

The sites listed by UNESCO were first promoted by large states in a position to nominate large marine areas for the outstanding universal value of their ecosystems and to mobilize significant resources for the scientific demonstration and management of these areas. For example, the Great Barrier Reef (Australia), Papahānaumokuākea in Hawaii (USA), and coral reefs and associated ecosystems in New Caledonia (France) are inscribed on the World Heritage List mainly for their pristine natural features. However, in the implementation of their management, increasing attention

is being paid to the cultural dimensions of the indigenous peoples concerned. Other marine sites designated under a UNESCO label have also integrated cultural aspects as a priority: the Fakarava Biosphere Reserve in French Polynesia, the marine section of the Estate of Chief King Mata in Vanuatu, and more recently the marine section and the sacred reef pass of the cultural landscape of Taputapuātea in French Polynesia.



*Niau Atoll is part of the Fakarava Biosphere Reserve, French Polynesia. School children learn how to set traps to catch introduced rodents ©IRD/E. Vidal.*

#### Marine educational areas (MEAs):

The concept of “marine educational area” was born in 2012 in the Marquesas Islands (French Polynesia) from the imagination of children at Vaitahu Primary School (Tahuata Island) and with the support of the Motu Haka Federation, the former Marine Protected Areas Agency, the Government of French Polynesia, and the Marquesas Islands Community of Municipalities (CODIM). A “marine educational area” is a small coastal marine area that is managed in a participatory way by primary school children according to principles defined by a charter. It is an educational and eco-citizen project to promote knowledge and protection of the marine environment by young people. The school class is thus part of a territorial dynamic that calls on the expertise of the school and the municipality involved, but also that of local associations (e.g., users or environmental protection).



# PROTECTED AREAS THAT ADDRESS HUGE ENVIRONMENTAL AND SOCIETAL CHALLENGES

*Human pressures on natural habitats are increasing and multiplying, mostly because of the transformation of environments and uses. Resource extraction is intensifying, and natural habitats are increasingly fragmented and isolated. In Oceania, problems related to population growth and the rapide development of tourism, although embracing contrasting situation, are now also adding to the list. In this context, protected areas must evolve to address future challenges.*

**Key message 3 – The design of a protected area and the pragmatic implementation of its management method benefits from taking into account the diverse objectives and concerns of stakeholders as well as new societal and economic dynamics**

Modernity brings its share of transformations in the household economy: employment is more frequent, societies are increasingly monetarized, and populations have to face new consumption needs. The increase in the migration of people and the development of urbanization require the adaptation of planning and environmental management policies. In such a context, the distinction between urban and non-urban areas, as well as the fluxes and exchanges between the two (natural resources, manufactured products, tourists, etc.), are

essential criteria to consider when planning protected areas. They are as important to take into account as customary territorialities and the interplay of powers and legitimacy between stakeholders in the various areas.

For many countries and territories in Oceania, protected areas are attractive tourist places that are politically supported as a source of economic development. While these sentinels of global change represent an opportunity for local as well as international environmental awareness and support participatory sciences (citizens contribute to ecological monitoring in these areas), they also generate a potential for pressure, even destruction, calling for the most considerable caution and the creation of protected areas that are inaccessible to mass tourism.



1. Uturoa Wharf in Ra'iatea Island, French Polynesia – 2,3. Thousands of tourists on Ouvea Island in 2007, before this type of cruise tourism was banned, New Caledonia © GIE Oceanide/J.-B. Herreschmidt.

**Key message 4 – Protected areas in Oceania are opportunities for resilience to address food and health insecurity**

About 80% of the population of Oceania depends on natural resources for food. However, the natural agricultural and lagoon heritage is eroding. For example, the number of varieties of taros, yams, and bananas is decreasing. It was not unusual, until about twenty years ago, to find 100 to 120 different plants in a traditional garden, but this is not true anymore. This food heritage, essential to the Oceanian lifestyle, no longer provides food security for the local populations that are increasingly dependent on imports, particularly rice. In the coming decades, in a global context of soaring demographics and climate change, access to the rice market could become increasingly difficult, raising the issue of resilience and food security for the peoples of Oceania.

In terms of health, preserving biodiversity also means ensuring the sustainability of a healthy diet that is severely affected by the massive introduction of fatty and sweetened manufactured food products, leading to an explosion of non-communicable diseases, as illustrated by extremely worrying rates of obesity and diabetes in Oceania. Besides, biodiversity and related knowledge allow the persistence of traditional medicines that are primarily based on the pharmacopeias ritually mobilized daily.



*Traditional cultivated fields, Espiritu Santo Island, Vanuatu © IRD/H. Jourdan.*



*Fish market, Suva, Fiji © IRD/H. Jourdan.*

**Criteria to be considered in delineating protected areas and designing their management in Oceania:**

- The ecological and heritage uniqueness of the area under consideration, both in terms of quality (populations, particular or endemic species) and functionality (biotopes, remarkable ecosystems, unique ecological processes).
- A high level of ecological connectivity, often established over a land-sea continuum, to protect functional areas in a context of fragmented territories.
- The endemic, and therefore unique, nature of many species and habitats, which gives strong regional or global significance to management policies.
- The contiguity of EEZs which forms an exceptionally large joint marine territory under the jurisdiction of the States and Territories of Oceania. This situation is an asset for planning marine environmental management policies throughout Oceania and ensuring that relevant ecological connectivities are maintained.
- The fact that Oceanian populations perceive their island environment as a symbiotic relationship and that it is not possible to translate “nature” or “biodiversity” into Oceanian languages.
- The fact that many Oceanians think of their territory as a land-sea continuum, facilitating the implementation of integrative protected areas.
- The specific land-ownership organization (diversity of land tenure statuses: private, public, customary) and the often collective nature of Oceania’s territories necessitates the involvement of many stakeholders in defining and sharing the challenges of the protected area and its management.
- The boundaries of terrestrial lands or customary territories facilitate the delineation of protected areas that align with valleys and watersheds.
- Areas where local knowledge is still and where the custodians of this knowledge are open to collaboration with the outside world are conducive to the cultural enhancement of biodiversity and its conservation.

**Key message 5 – Biodiversity and protected areas must be systematically included in land-use planning processes**

In an Oceanian island environment, the conservation of biodiversity must take two ways of understanding the place. On the one hand, customary organizations administer and design the management of the area where different sovereignties operate according to an approach based on the territories of families, clans, and chiefdoms. They take into account land-ownership structures, spheres of influence, cultural hotspots, and the legitimacy of each individual. On the other hand, local authorities address development using a spatial planning approach in the areas and sectors in which they have competence, to anticipate and organize urbanization, the development of economic activities, and environmental conservation.

However, the challenges of conserving natural environments and biodiversity extend beyond the boundaries of customary and administrative territories. In Oceania,

much of the land is customary or private, and protected areas are often created as a result of local opportunities. Each community, therefore, protects what it can on the territories where its sovereignty applies. As a result, the extent and scale of the protected areas are not necessarily the most relevant in terms of biodiversity and ecological processes.

In this context, the protection of biodiversity requires a careful balance between the planning of areas for the protection of the most relevant environments and the territorial projects carried out by local or customary authorities. For optimal protection, a land-use planning approach must be shared at different scales and systematically integrate the risks weighing on biodiversity, according to hybrid governance methods adapted to specific contexts. In practice, protected areas must be part of negotiated territorial projects, which requires the prior acknowledgment of local territorialities and the empowerment of local stakeholders in their own territorial and heritage domain.



© SPC

*It is important for Vanuatu people to conserve biodiversity as our tradition and culture are closely linked with biodiversity. It is through our relationship with the natural ecosystem and biodiversity that Vanuatu people have co-existed in the archipelago for generations despite constant threats such as extreme weather events and volcanic eruptions. In recent times, our biodiversity is under threat from increased population growth, the adoption of modern living in place of traditional subsistence way of life, and climate change. Our generation, therefore, has to take a step to conserve our biodiversity for these ever-increasing threats. In doing so, we will allow the natural balance of co-existence between nature and our people for this generation and the future.*

Jeremie Kaltavara, Senior Fisheries Biologist,  
Vanuatu Fisheries Department, Vanuatu



Efate market, Vanuatu ©IRD/C. Sabinot.



# STRENGTHENING A GOVERNANCE BASED ON INCLUSIVE SYSTEMS OF CO-MANAGEMENT

*Despite a great heterogeneity of situations, human and financial capacities of States and local stakeholders, the protection of biodiversity via protected areas in Oceania have to be organized through inclusive co-management systems. And, because of the scale of the work, involving thousands of island communities scattered among the archipelagos, the 26 Oceanian Countries and Territories need strong support from the international community.*

## **Key message 6 – Working towards inclusive systems of co-management and participatory governance, involving, in particular, customary authorities and users**

In Oceania, the inclusive approach is at the center of processes for the creation and management of protected areas, engaging both the authorities involved in decision-making and the populations concerned by the protection, in particular, indigenous communities.

Indeed, in Oceania, there are several systems of authority and management. Over the past two centuries, colonization, religious influences, and migratory movements have marked history, producing a diversity of authority and management systems. The territories are characterized by fields of influence that are structured in different ways and result in more or less formalized divisions of competence. State systems, local authorities, customary authorities, religious and community organizations all have a share of influence and legitimacy in the development of environmental management regulations and decision-making. Involving the various authorities in the co-management of a protected area determines its ownership, respect, and effectiveness.

There are many stakeholders with different uses of environments and ecological expertise related to their practices. Groups of users who are not always professionals, such as fishers, hunters, and women, are essential for their management because they

have developed specialized practices in some of the territories.

All generations are concerned and feel involved in the design and management of protected areas. Knowledge custodians are often elders and worry about passing on their knowledge. At the same time, some young people, aware that they have spent little time with their elders practicing their traditional places and subsistence activities, want to reclaim “their” ecological and cultural knowledge and continue to gain on scientific knowledge about their environment. Thus, a dynamic of revalorization of languages, local knowledge, “knowledgeable” people, and territories is emerging. The mobilization, sharing, and dissemination of scientific knowledge, complementary to local knowledge, is expected and must be adapted to each context in different ways.

### **Women’s knowledge**

When it comes to planning protected areas where biodiversity is relevant to traditional pharmacopeia or coastal fisheries, women are often a key group willing to share their knowledge. Their daily practice in fishing or gathering areas, their naturalistic knowledge, and know-how must contribute to the collective management of environments.



*Woman angling from the shoreline on the east coast of Efate Island, Vanuatu © IRD/C. Sabinot.*

### The power of consensus

In Oceania, the most effective shared management approach is not based on a principle of compromise, but consensus. Negotiations can take a long time, but it is the only way to reach decisions and choices that are sufficiently sustainable and understood by all. In this context, participatory methods adapted to the Oceanian context can help to achieve optimal acceptability and involvement of the relevant stakeholders.



*Gifts offered for traditional customary gesture, Gohapin Tribe, New Caledonia © IAC/N. Petit.*

### Key message 7 – Strengthening the capacity, cohesion, and cooperation of the Oceanian States and Territories within regional organizations to mobilize international support for the establishment and management of protected areas

The States and territories of Oceania have a central role to play in ensuring strategic and regulatory coherence at the “Country” level, as well as in coordinating and supporting local stakeholders, for building significant regional dynamics in biodiversity protection using protected areas.

The financial and human capacities of small Oceanian States are often relatively limited compared to the scale of the ecological challenges, and they are already mobilized by the basic economic needs of rural populations. For these small States, the best strategy is to empower local authorities and community dynamics in the management of protected areas, as much as possible, and to dedicate their public services to fighting “supra-threats” such as wastes, EEZ management, climate change, and biosecurity.

Building their capacities and those of local communities depends on their collective ability, at the regional level, to speak out and gain influence at the international level. Without a cohesive regional mechanism, similar to their mobilization against the impacts of climate change, the remarkable biodiversity of Oceania and its potential collapse in the face of new large-scale threats associated with global change will continue to remain invisible to the international community, preventing the

### The place of science in the delineation and long-term monitoring of protected areas

The delineation of protected areas is based on the selection of appropriate boundaries adapted to the optimal preservation of biodiversity. It requires the mobilization of scientific references and data - relict populations, rare and threatened species, species richness, diversity, uniqueness, functional diversity - that allow the characterization of reference states or baselines. These baselines serve as a reference to monitor habitats and biodiversity and to assess the effectiveness of protected areas and management measures. Sharing data over the long term by involving scientists, managers, and local stakeholders is also critical leverage, as is participatory science. Finally, access to data through open and fair science - data, results, methods, tools, interoperability - would facilitate a broader and more sustainable dissemination of knowledge.

development of protected areas commensurate with the challenges.

In terms of biodiversity, small island States in Oceania will only be able to make a significant contribution and participate in international agendas if they are collectively recognized, in the same way as their indigenous peoples, and local communities already are, as the custodians of the Pacific Ocean, and its exceptional island biodiversity heritage, for the international community. This recognition should receive international support, particularly financial support for the services they provide, as well as scientific support to continue the inventory of biodiversity, in collaboration with regional organizations (SPC, SPREP), and consolidate the existing dynamics of terrestrial and marine protected areas.

In a region characterized by fragmented small island States, the trend is towards reinforcing the capacity of administrations public authorities, and local stakeholders, facilitating the dissemination of knowledge on biodiversity, building capacity for coordination, involving local stakeholders in management and encouraging national and regional organizations to support them.

Finally, protected areas can be regarded as sentinel sites for monitoring trends and changes in biodiversity, as well as support sites for environmental education and knowledge sharing, while maintaining intergenerational ties. Protected areas are also a tool to raise awareness about biodiversity issues among policy-makers.



**Coordination by** C. Sabinot, J.-B. Herrenschildt, H. Jourdan, J.-F. Silvain.  
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**Editorial support by** V. Grizon.









## Part 3

### BIODIVERSITY, ENDOGENOUS AND CUSTOMARY LAW, AND TRADITIONAL KNOWLEDGE.



The diversity of life in Oceania is rich and exceptional in many ways but is increasingly vulnerable to many risks of natural or anthropogenic origin. An effective and efficient legal framework for the conservation, access, and valorization of this biodiversity requires taking into account the plurality of social, political, economic, cultural, and legal situations. Although all Pacific Island Countries and Territories have more or less elaborate environmental legislation, it is worth highlighting, as shown in the 2019 IPBES report, that biodiversity degradation is still ongoing

*The Whanganui River was recognized as a legal entity by the New Zealand Parliament on the 1st of March 2017  
© C. Herb Wanganui Conservancy.*

# AN ENVIRONMENTAL LAW THAT IS CURRENTLY NOT ACHIEVING ITS OBJECTIVE

*The evidence is that the environmental law currently in force in the countries and territories of Oceania most often results from the transposition of international treaties and model laws and does not achieve its objective, which is to contribute to the preservation of biodiversity. Anthropocentric conception, state sovereignty, vulnerability to environmental offenses... many factors can explain this situation.*

**Key message 1 – The current environmental law does not protect biodiversity from the extinction crisis because several factors make regulations ineffective**

The first and most obvious reason for the ineffectiveness of environmental law is that the current legal framework is often a transposition of international standards or the adoption of model laws developed without taking into account the Oceanians view of the world. The anthropocentric perspective of nature, which prevails in Western law, remains predominant and does not reflect the more integrative conceptions of Nature that are specific to the Oceanians.

The second reason is that the Sovereignty of states can be a limit to the harmonization of environmental management in the region, even if this sovereignty can, in some cases prevent the standardization of legislation.

The third reason is that environmental law struggles to control both the impacts of the daily activities of local populations and those of international companies.

The fourth reason is that, although almost everyone is aware that some resources are not infinite and some ecosystems are vulnerable, laws do not go as far as to integrate ecological and planetary boundaries into the measures they enact.

Finally, the last reason we identified is the difficulty faced by States to reconcile short-term policies with more sustainable management, which is essential given the decline in resources.

More generally, faced with pressures from all sides (economic pressure, pressure from other states, climate pressure, etc.), states face difficulties in applying or even strengthening their national laws. This vulnerability is also reflected in environmental crime, with, as an aggravating circumstance, large exclusive economic zones whose surveillance is made particularly difficult because access to modern technologies is often not available.



*Protected species in Oceania are frequently the target of illegal international trafficking. Only one specimen of the palm tree Saribus jeanneneyi now exists in its natural state in New Caledonia. Its geographical location is kept secret because its seeds are worth several thousand francs on the black market and are highly sought-after by collectors ©Lincks/E. Bonnet-Vidal.*



*The legendary Torres boa, Candoia biboni, Torres, Vanuatu. Some of the rare reptiles in Oceania are worth \$6,000 on the black market ©J.-L. Menou.*



**Key message 2 – Environmental law must take into account local populations, both during its drafting and in its application, to achieve its objective of biodiversity conservation**

Environmental law is one tool that can be used to limit the anthropogenic impact on biodiversity erosion or climate change and to support populations in their resilience. Existing legal tools must pay as much attention to the diversity of coexisting legal systems as to sociological approaches that allow for a better understanding and appraising of local concepts. Indeed, traditional societies offer many opportunities for the evolution of environmental law in general. For example, the Australian government has considered Indigenous representations of the sea by Aboriginals to develop, with them, coastal management rules for the entire southeastern part

of the island continent. In Fiji, the NGO Fiji Locally Managed Marine Area supports communities in their efforts to protect their resources and environment and proudly displays on its website the progress made by villagers for biodiversity conservation. The IUCN report of October 2018, resulting from the “Blue Solutions” project, illustrated the successes achieved by some 20 local communities in marine conservation in the Pacific and elsewhere. Elsewhere in the world, from Honduras to Madagascar and Africa, bright spots are emerging as successful examples of biodiversity conservation by local communities that can serve as a support and model for public policies.

As a result, many avenues can already be identified to propose new recommendations for a future post-2020 agenda: protecting traditional knowledge, ensuring the effectiveness of environmental law, and reconciling human populations and natural resources.



**1.** Rahui meeting in Puhine, French Polynesia. The Rahui is a traditional fallow system specific to Polynesia. Before the arrival of Europeans, chiefs used to ban hunting on certain lands or fishing in particular areas of the lagoon. Abandoned for a while, this way of managing natural resources is being resumed and based on consultations with local populations ©INTEGRE/CPS – **2.** Raui signboard in Polynesia ©D. Robinson – **3.** Marine beacon ©C. Vieux.

# SAFEGUARDING TRADITIONAL KNOWLEDGE TO PROTECT BIODIVERSITY

*The United Nations proclaimed 2019 as the International Year of Indigenous Languages and estimated that 40% of the 6,700 languages spoken in the world are threatened with extinction. In Oceania, whether Polynesian, Aboriginal, Austronesian, or Papuan, there are hundreds of indigenous languages representing the invaluable traditional knowledge that has enabled indigenous peoples to live in harmony with Nature over the centuries.*

**Key message 3 – Linguistic diversity and biological diversity are closely linked. Safeguarding indigenous languages and traditional knowledge plays a key role in protecting biodiversity**

There is a fundamental link between linguistic diversity and traditional knowledge associated with biodiversity. For example, indigenous languages around the world:

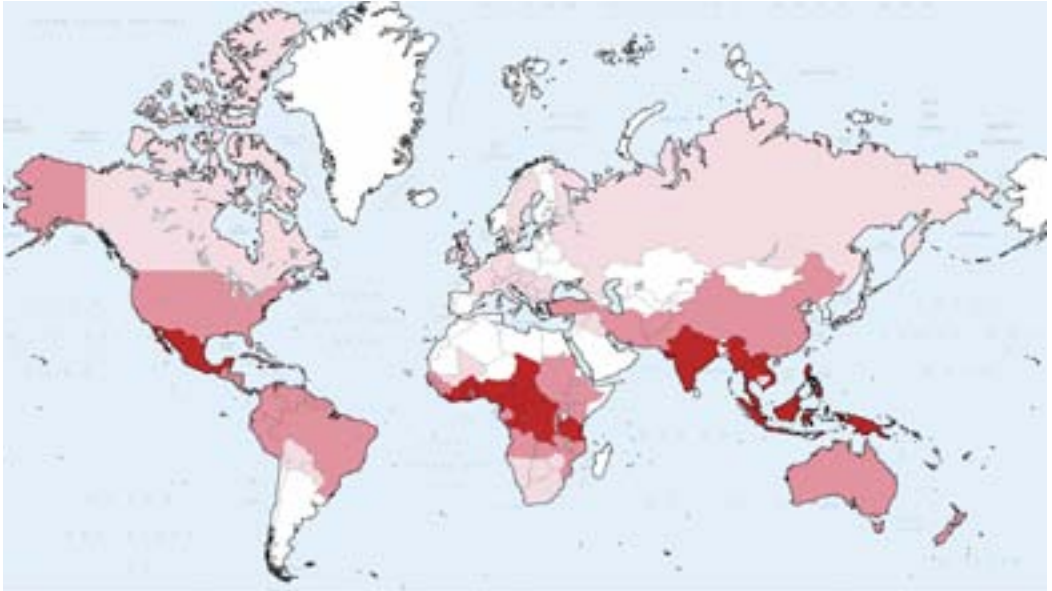
- Provide access to alternative knowledge.
- Reflect non-industrial economies.
- Are the best way to raise awareness among populations speaking rare or minority languages.

- Have the same dynamics as biodiversity with, currently, an increased threat of extinction.

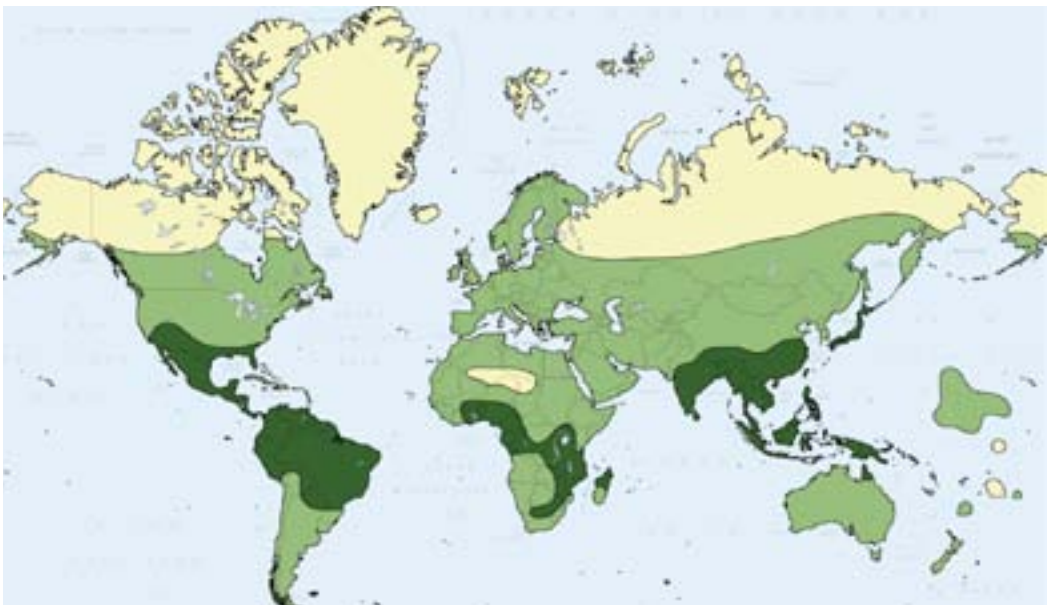
At the same time as biological biodiversity is decreasing, linguistic diversity is eroding. The co-occurrence of the two trends was identified by several surveys that argue endangered languages have a role in providing access to ecological knowledge. These surveys also show that biodiversity hotspots account for 70% of the world's languages. The issue of biodiversity in Oceania, an exceptional multilingual and plurilingual region, therefore requires strategies in terms of co-management of Oceania's linguistic diversity. Linguistic rights and diversity must, therefore, be advocated, in particular for the protection of biodiversity.



Vanuatu has the highest linguistic density in the world with 108 distinct vernacular languages for 272,000 inhabitants and 81 islands © Lincks/E. Bonnet-Vidal.



**High linguistic diversity**



**High biological diversity**

*There is a close correlation between the distribution of biological diversity and that of linguistic diversity: hotspots of biodiversity are home to 70% of the world's languages. Source: Grinevald C., 2008.*



**Key message 4 – Indigenous peoples must be more involved in safeguarding their traditional knowledge because the Nagoya Protocol, while it is useful and necessary in terms of intellectual property rights, is not a sufficient instrument for the conservation of such knowledges and practices**

The Nagoya Protocol on Access to Genetic Resources and Fair and Equitable Sharing of Benefits Arising out of Their Utilization (ABS) to the Convention on Biological Diversity (CBD) was adopted at the 10<sup>th</sup> Conference of the Parties in 2010 in Nagoya, Japan. It was ratified by some states of Oceania including Vanuatu, Fiji, the Marshall Islands, Micronesia, Palau, Samoa, Tuvalu, Australia, and France, under its Act No. 2016-1087 of the 8<sup>th</sup> of August 2016, for the recovery of biodiversity, nature, and landscapes. The objective of this Protocol is to provide for more legal certainty and transparency to providers and users of genetic resources to prevent biopiracy. It oversees

the implementation of agreements on bioprospecting and biodiscoveries, with the informed consent of local populations. The protocol allows for equitable benefit-sharing, not necessarily financial, resulting from resource use, as well as the protection of traditional knowledge. While the Nagoya Protocol and the associated structuring of local people's consent is a necessary tool, it is not sufficient to protect traditional knowledge, which is often key to biodiversity conservation. Conciliating oral traditions and commitments with contractual approaches based on individual will is often challenging to achieve on the medium to long term when sharing uncertain benefits. There is a need to strengthen the involvement of indigenous peoples for safeguarding their knowledge in modalities and forms that are familiar to them. In this context, we propose to develop a regional network for customary authorities, with a platform dedicated to indigenous knowledge and practices. Besides, where possible and relevant, the customary law system should be made the very foundation of legal systems.



Tests of natural substances extracted from New Caledonian plants © IAC-N-Petit



© OEIL/M. Juncker

*We, the customary people, endorse all the recommendations that have been made. But tradition must be valued as an element of research, a constituent part of knowledge. Oral traditions are too often reduced to tales. We must recognize the customary actors, the chiefdoms, who are different from the local population. We must acknowledge the traditional custodians of knowledge, the clans of the sea and the land. And it is not only a question of science but a global vision of nature.*

Raphaël Mapou, Clan chief, Yaté, New Caledonia

*At the regional level, there is no dedicated space for customary and indigenous people to share their knowledge. When you follow the customary path, you start from New Caledonia and go to Vanuatu. The Vanuatu Council of Chiefs is our gateway to Fiji, which is itself our gateway to the Solomon Islands, Papua New Guinea and then Polynesia. However, all these countries are involved in biodiversity research. It would,*



© IRD/I. Gasser.

*therefore, be useful that local authorities and the customary people of all these countries could exchange ideas together and set their framework.*

Jean-Luc Mahé,  
Secretary-General  
of the Customary  
Senate of New  
Caledonia

*Each island must define its cultural, natural, tangible, and intangible heritage, but we must speak with a united voice. The critical question is how islands can benefit from their natural heritage. One example is traditional medicine. How to recognize it? How to preserve it? Some contributions provided a new vision, such as the one on the link between linguistic diversity and*



© IRD/M. Vilayleck.

*the protection of biodiversity or the one on the recognition of the Rights of Nature.*

Matilite Tali,  
President of the  
Federation of  
Environmental  
Protection  
Associations  
HAOFAKI TE  
ULUFENUA,  
Wallis and  
Futuna



Maori sculptor in Rotorua, New Zealand © Lincks/E. Bonnet-Vidal.

# ENSURING THE EFFECTIVENESS OF THE LAW TO PREVENT ENVIRONMENTAL DAMAGE

*Improving the effectiveness of environmental law, i.e., moving from words to action, is an urgent need that requires new areas of legal research. In this perspective, it is necessary to consider not only the most appropriate content of environmental legal rules but also the potential leverages to promote their implementation. The challenge for environmental law is to effectively influence behaviors, i.e., that the “ideal world” described in the law translates into the “real world.”*

**Key message 5 – We must develop meaningful legal rules that everyone knows, understands and respects**

Environmental law is effective if the authors are legitimate, if the procedures promote the identification of the offenders, if the sanctions are convincing and useful, and if the legal rule makes it possible to prevent the damage. It is essential that the public acknowledges the legitimacy of the authors of the legal standard and trusts the necessity of the restrictions imposed on uses and projects. For the environmental law to reflect the ecological and social requirements of society, in a context of representative democracy, it is essential to determine “who” to involve and “how.” Elected officials may not be experts and do not necessarily have the same perception of the environment as those to whom the legal rule is addressed. The former must be able to rely on third parties such as committees, experts, users, customary people, associations, professionals, citizen juries, etc. The legitimacy of third parties is not

always characterized in the same way if, for example, it is about prohibiting hunting in a customary area or prohibiting luminous pollution in the city. The modalities chosen must be legitimate on a case-by-case basis while remaining coherent and legal. For anticipating good compliance with the recommendations, it is necessary to consider the modalities of public participation so that everyone can express their point of view. Special effort must also be made to promote education for sustainable development so that everyone understands the challenges in their home territory. Significant resources must be deployed to provide access to environmental information.

**Innovating and adapting to local contexts.**

A more innovative approach could be developed to involve the Oceanians to whom the environmental rule is addressed, from its design to its maturation. In recent years, a growing number of novel democratic



Access to some islets in the Northern Province of New Caledonia is restricted during the breeding season of protected seabirds. Nature wardens ensure compliance with the regulations © Province Nord/N-Petit.



participatory tools were developed in sub-national territories that could be of interest to the small Pacific Island States and Territories. Examples include citizen workshops that allow non-experts in a given field – particularly controversial ones – to receive training by experts and then participate in joint decision-making. Collaborative workshops also provide an opportunity for small groups to co-construct and manage projects. By diagnosing problems and seeking shared solutions together, they have a chance to overcome possible disagreements between the stakeholders involved. These tools, among others, are perfect candidates to create the synergies, between traditional knowledge and practices and scientific knowledge, that are necessary for the protection of biodiversity. In the Pacific, where Oceanian and Western legal systems coexist, these solutions call for particular considerations and the invention of novel adaptations.



Victor David, chairman of workshop ©IRD/N. Petit.

### Key message 6 – “Prevention is better than cure”: for being effective, environmental law must first and foremost prevent ecological damage

Faced with threats to biodiversity, that are cumulative, we must anticipate. It is the first task of an efficient environmental law, its trademark, its specificity. Why? Because restoration after environmental damage is complicated to achieve both ecologically and economically, sometimes impossible when the damage is irreversible. Moreover, in some cases, the legal liability can be difficult to establish with the recurrent question of the causal link between fault and damage. With this objective of enhanced effectiveness in mind, several research projects, often complementary, are underway to design new legal tools that are immediately and easily applicable. It requires reflection on the definition of biodiversity, nature, their components and the means to protect them; on the ability to introduce new concepts such as risk, the long term, the specificity of nature and its components, harmony and scientific uncertainty, relying where appropriate on the contribution of traditional societies. The ongoing work on the introduction of new offenses is associated with an analysis of their practical implementation, in particular, their geographical application and the conditions required to enable their application. Regional cooperation should also engage in monitoring and enforcement.

### Key message 7 – Sanctions must be dissuasive and have a restorative function

In the event of non-compliance with the regulation, the law is the tool that allows enforcement. The objective is to organize procedures which, while respecting fundamental rights and freedoms, will promote the identification of offenders and the characterization of offenses. This is a major challenge, especially in the open sea or in natural terrestrial environments that are not frequently visited.

Criminal sanctions must be convincing and useful. The aim is to discourage those who have an interest in violating the rule but also to raise awareness among those who did not understand the purpose of the rule, for example, through environmental citizenship training courses. A restorative function of the sanction itself may also be considered, notwithstanding civil reparations. It requires structuring a criminal response on a case-by-case basis, based on a range of sanctions.

Investigation services (gendarmerie, national police) and academics in France have initiated a joint reflection on the relevance of introducing a new criminal offense of “environmental endangerment” which would, in particular, make it possible to act before the damage has occurred.



The Kéa trader ran aground on the 12<sup>th</sup> of July 2017 off the island of Maré, in New Caledonia and is causing damage to the reef. Dismantling operations have been carried out since ©Right Reserved.



Coral development at restoration site, GBR, Australia ©CSIRO/C. Doropoulos.

# IMPLEMENTING A NEW PARADIGM IN OCEANIA: CONSIDER MAN AS PART OF NATURE AND RECONCILE THEM

*New links between Man and Nature are essential for preserving biodiversity, relationships that recognize Man as a part of Nature are in accordance with many Oceanian visions of the world. It requires educational actions on the interconnection of all lives to understand and live within ecological limits. It also implies acknowledging the Rights of Nature and changing its legal status. National laws already protect some elements of Nature as legal entities. It is now necessary to take a new step forward and change the legal status of Nature, to recognize its rights as a distinct legal entity and no longer as possession of Man.*

## Key message 8 – Promoting the Rights of Nature as an instrument for the protection of biodiversity in Oceania

A paradigm shift in Western law, through the recognition of the Rights of Nature, is needed to rethink how human society interacts with, uses, and cares for the living world. A new paradigm could reconcile Man as part of Nature and not as its owner/operator.

Once considered unthinkable, the recognition of the Rights of Nature is nowadays not only a legal possibility but also a necessary step in the development of environmental protection laws, as existing legal frameworks do not deliver the expected results. It is demonstrated by the insistent demands worldwide from indigenous peoples, communities, and courts for the legal recognition of the Rights of Nature, the growing jurisprudence setting out what the Rights of Nature are and how they can be applied, and even the emergence of customary international law. Examples such as the Whanganui, Ganges, Yamuna, Narmada, and Amazon rivers, and the Nature laws in Ecuador and Bolivia, have paved the way for further promotion of the Rights of Nature. From Uganda to Lake Erie, examples of the recognition of the Rights of Nature are spreading around the world and are almost always based on holistic cosmovisions similar to those of the Oceanians.

To recognize Nature as having its own legal rights represents a new and stronger way to protect and restore the living world. This legal recognition will probably allow the introduction of the “crime of ecocide” to prevent and punish the large-scale destruction of natural systems.



Pentecost Island, Vanuatu © F. Cayrol/LabEx-CORAIL-UNC.

## Key message 9 – Recognizing the Pacific Ocean as a legal entity would meet the requirements and efforts of Oceanians to protect their vital, nurturing, and spiritual element

In line with Sustainable Development Goal 14 on the preservation and enhancement of oceans and seas, adopted in 2015 by the United Nations General Assembly, it seems clear that the Pacific Ocean has the full potential to benefit from this approach.

The Pacific Ocean is more than just water or a source of food for most Pacific Islanders. It is part of their lives, their families, their blood. The land, the sea, and people form a whole. Recognizing it as a legal entity is consistent with the cultural background of the Pacific Islands and the repeated efforts of their leaders to protect their “Blue Pacific.”

As part of a voluntary commitment to the United Nations Conference on the Ocean (#OceanAction 19759), the first step consists in exploring the possibility of recognizing the Pacific as a legal entity with rights, following existing international law. To this end, a regional treaty between the Pacific Small States and Territories (SISTerrs) could improve existing national laws. It could propose new laws to treat and protect the ocean as a person, increase its resilience to climate change and to the overexploitation of its past and future marine biodiversity, and give it a full legal voice in the process.



The Pacific ocean, from a living entity to a legal entity (La Foa, New Caledonia) © Province Sud/M. Dosdane.

# TAKING ACTION

*For the experts, the Pacific Ocean and the countries of Oceania provide a unique platform for innovating in legal matters and creating new and truly effective tools for the protection of Nature. Traditional knowledge, customary rules, the unified relationship between Man and Nature as well as participatory projects, would be at the heart of a mixed and re-enchanted legal system.*

At the end of their work, the experts offered a series of recommendations for each of the themes explored above:

- To defend linguistic rights and diversity for the benefit of biodiversity conservation in particular.
- To develop regional collaboration between customary authorities through the creation of a network of indigenous knowledge and practices.
- To use the customary law system as the basis for environmental legislation where appropriate.
- To facilitate the acceptability of the legal rule by involving its target audiences.
- To involve customary people and the local population in drafting the law and enforcing sentences.
- To organize a procedure that enhances the chances of identifying offenders and characterizing environmental offenses.
- To anticipate offenses that can have irreversible effects and apply convincing and useful sanctions.
- To initiate discussions for enhancing the preventive dimension of environmental law, in particular on the introduction of new offenses.
- To promote regional cooperation for the monitoring and enforcement of environmental law.
- To acknowledge the Rights of Nature and promote the legal personality of Nature.



Workshop © IRD/N. Petit.

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**Editorial support by** V. Mézille.









## PERSPECTIVES

# HEADING TO KUNMING

## A dense international agenda with close milestones where Oceania's voice must be heard more and better.

During the two days of workshops and meetings held in Noumea, discussions between experts and participants were intense, as the reader can see from this synthesis, and everyone agreed on the urgency of the situation, as evidenced by the publication of this document only a few weeks after the event.

The ideas that were put forward during these two days echo the specificities of the Oceania region in terms of biodiversity crisis and erosion of ecosystem services. They also highlight the different concepts of biodiversity management and sustainable use and those that should be given priority in Oceania, a region where, traditionally, Man is an integral part of Nature from which he is inseparable.

Oceania, composed of fragmented and dispersed lands, united and federated by the Pacific Ocean, is particularly affected by the global biodiversity crisis and its countless and complex deleterious consequences. The "scientific" knowledge of Oceania's biodiversity is still insufficient, but traditional knowledge contains a significant part of it, the survival and transmission of which must be preserved.

**Everyone has understood the urgency of taking action on climate change today. The other fundamental issue in the Pacific is the biodiversity on which all Pacific societies are rooted.**



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Ms. Sylvie Goyet,  
Director of the Environmental  
Sustainability and Climate  
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Habitat loss, changes in land and sea use, and biological invasions are the most significant threats to biodiversity and ecosystem services in this region. In Oceania, the collapse of biodiversity would be an unprecedented ecological and economic tragedy due to the disappearance of subsistence food capacities that are essential for food security in the region. It would have a profound and irreversible impact on the socio-cultural wealth of Oceania's societies, on which their resilience is based. If the ties between the Oceanians, their land and sea were to be severed, socio-cultural poverty would be added to economic poverty, ending millennia of civilization. The diversity of stakeholders with their concerns and expectations requires that

they are considered and their contributions integrated into the design and implementation of management strategies and conservation measures. Similarly, if environmental law is to integrate customary rights, for it to be effective and achieve its objectives, it is necessary to take into account local populations and their use and relationships in that environment, both in its development and in its implementation.

This exceptional, but fragile and declining, terrestrial and marine biodiversity confronts the States and Territories of Oceania with severe challenges and responsibilities, and this in spite of themselves. Indeed, for geographical, economic and cultural reasons, this region of the world contributes little to the global ecological crisis and does not always have the capacity to deal with the main threats, many of which come from outside the region. The parallel with the climate crisis that is affecting the low-lying Pacific islands so severely is obvious.

**This regional workshop is timely because we are engaged in a major international agenda on biodiversity, which will culminate during the COP15 in China by the end of 2020. The Pacific can and must play a significant role in this process because, more than any other region, it represents the climate-biodiversity-ocean continuum. The voice of the Pacific can mobilize the world for biodiversity as it mobilized the world for the climate in 2015. This Noumea event brings the voice of scientists and the message of Oceanians to the world: a voice and a message that are firmly committed to action.**

Mr. Hervé Dejean de la Batie,  
Permanent Secretary for the  
South Pacific, Permanent  
Representative of France  
at the Pacific Community  
and the Pacific Regional  
Environment Program



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What should we do to address this situation? Three key ideas emerged during these two days of collective work.

Number one is the need to share, disseminate, and raise awareness of scientific and traditional knowledge about biodiversity in Oceania, both locally and globally. Because traditional knowledge is part of the memory of the elders and perpetuated only through generation-to-generation transmission, it is essential to use relevant media and communication tools to reach a wider audience, especially among the youngest generation.

Second is the need, perhaps here more than anywhere else, for scientific solidarity that is even stronger, better structured, and coordinated. It is the only way to respond quickly and effectively to the magnitude of the issues and expectations generated by the biodiversity crisis. Such a challenge also requires better support from national and international funding agencies and the strengthening of research structures.

The third idea, closely linked to the previous ones, is to urgently take into account the voice of the Oceanic States and Territories so that it is better listened to and heard, particularly in international arenas dealing with the global biodiversity crisis, as is currently the case in the climate negotiations.

***The 10<sup>th</sup> Pacific Islands Conference on Nature Conservation and Protected Areas will be the first regional meeting focusing on conservation in 2020, and the conference will be celebrating its forty-fifth year. The conference will guide regional conservation policies post-2020, and define the “Voice of Oceania”, with messages that will be shared with the rest of the world through other important global meetings to be convened in 2020. In particular, the Pacific voice will be heard at the IUCN World Conservation Congress in France, Our Oceans conference in Palau, the UN Ocean Conference in Portugal, and the Conferences of the Parties of the UN Convention on Climate Change in Chile and the Convention on Biological Diversity in China. These few closing words, therefore, do not end this workshop but prepare for the next steps of the journey.***



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Kosi Latu,  
Director General of SPREP

Finally, because Oceania alone represents nearly 10% of the world's surface area and its demographic, economic, ecological, and cultural issues are clearly different from those of neighboring Asia, a conclusion was reached by the experts gathered in Noumea: this region and its remarkable biodiversity must be given special attention as of tomorrow. It applies in particular to the evaluations of the intergovernmental platform IPBES. Oceania can no longer be considered as one element among others within the vast Asia-Pacific region that has so far provided the framework for the regional assessment.

***The aim is to see how these specificities and constraints can be turned into incentives and benefits to rapidly engage the region in a strong dynamic of reducing biodiversity damage and loss of ecosystem services. I would like to recall the current and very dense international context, which will lead to the COP15 of the Convention on Biological Diversity in October 2020 in Kunming, China. The hope of many of us is that during this interval of almost a year and a half, states will mobilize to reach an international agreement on biodiversity in Kunming, of the same or even greater significance as the Paris Climate Agreement. One of the main ideas that emerged from these Noumea workshops was to bring to IPBES, but also to IUCN in Marseilles and COP15, the need for a more detailed examination of Oceania, particularly its ecological and socio-cultural specificities. I will try to contribute to this ambition, and I promise you, dear colleagues, to help establish the link with the IPBES secretariat.***

Dr. Jean-François Silvain,  
President of the French  
Foundation for Research on  
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## On the way to Kunming!

# AFTERWORD



Thierry Santa,  
president of the Government  
of New Caledonia

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In 2018, the Pacific Regional Environment Programme consulted its members to choose the country or territory that would host the 10<sup>th</sup> Conference on Nature Conservation and Protected Areas in April 2020. Our proposal was accepted and that is both an honour and source of pride for New Caledonia, which has been committed for more than a decade to preserving its outstanding biodiversity – at the heart of our culture.

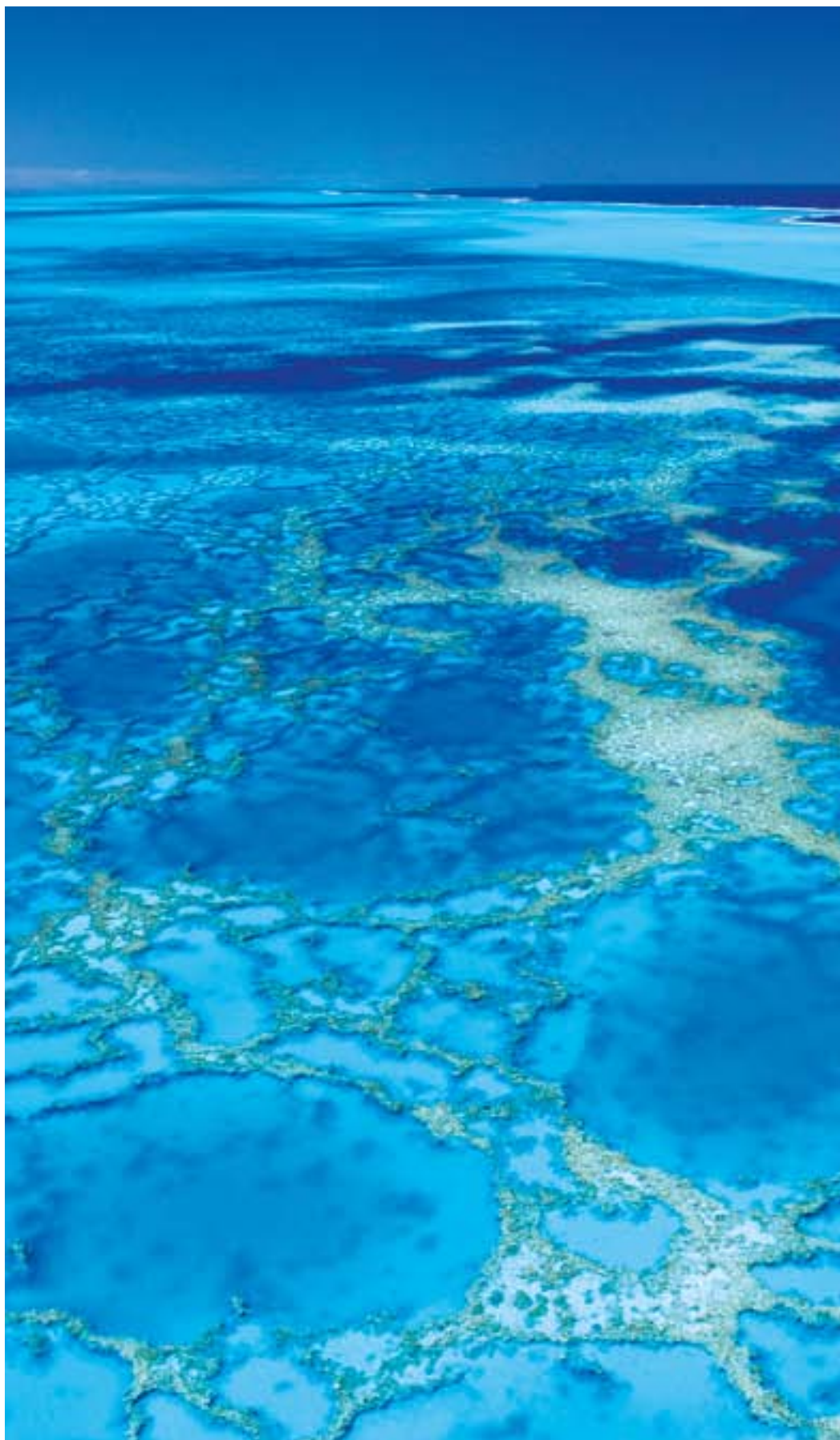
Six sites in New Caledonia were first included on UNESCO's World Heritage list in 2008. As a single unit forming one of the three largest reef systems in the world, the d'Entrecasteaux Reefs, Great Northern Lagoon, north and east coastal areas, Ouvea & Beautemps-Beaupre area, West coast area and Great Southern Lagoon joined the nearly 200 natural sites already listed throughout the world. Another significant step was taken in 2014 with the creation of the "Natural Park of the Coral Sea", France's largest marine protected area, home to ecosystems and species of rare abundance and diversity. Its pristine reefs, in particular, are among our planet's last coral reefs in a virtually untouched state and all of them have been classified (7,000 km<sup>2</sup> as wilderness areas and 21,000 km<sup>2</sup> as nature reserves) in line with the commitments New Caledonia made during the 2016 Our Ocean Conference. Last year, a management plan was developed for our natural park, approved by

its scientific committee and adopted by the institutions, traditional leaders, social and economic stakeholders and civil societies involved.

In a wider sense, New Caledonia wants to contribute our efforts towards the global drive to protect both land and marine biodiversity. Our region has not been spared by the unprecedented worldwide decline in biodiversity and ecosystem services, assessed for the first time by an IPBES committee of experts and presented during the 7<sup>th</sup> Plenary Session in Paris in 2019. The Pacific's voice needs to be better heard in international bodies and accorded particular attention, especially in IPBES assessments. With that in mind, New Caledonia joined Pacific Community, Pacific Regional Environment Programme, and New Caledonian and French Polynesian scientific consortiums in organising the regional "Biodiversity in Oceania" event in Noumea in June 2019 to call attention to issues related to marine and land biodiversity in the Pacific.

In many ways the 10<sup>th</sup> Conference on Nature Conservation and Protected Areas, which guides biodiversity conservation programmes in the Pacific, will be a major event. Not only will 2020 see the assessment of the United Nations Decade on Biodiversity but it will also mark the Paris Agreement's entry into force, providing a special opportunity to highlight this crucial symbolic step and give it full meaning, since biodiversity and climate change are such intertwined issues. Given that, we want the conference to be oriented towards action and specific concrete solutions based on the IPBES' expert advice and the recommendations in this report, such as those inspired by Pacific Islanders' social and cultural practices. I truly hope that the conference will bring a powerful declaration to the international stage, particularly COP 15, committing the Pacific's political authorities to preserving biodiversity, the very foundation of our lives and cultures. I am confident of your close commitment and support in making the conference a success as your involvement will be a decisive factor.





*Nessadiou lagoon, UNESCO World Heritage Site, New Caledonia © Province Sud/M. Dosdane.*



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## LIST OF ACRONYMES

<b>ABS</b>	Access and Benefit Sharing
<b>CBD</b>	Convention on Biological Diversity
<b>CePaCT</b>	Centre for Pacific Crops and Trees
<b>CNRS</b>	National Center for Scientific Research (Fr)
<b>CODIM</b>	Marquesas Islands Community of Municipalities
<b>COP</b>	Conference of the Parties
<b>CRESICA</b>	Consortium for Research, Higher Education, and Innovation in New Caledonia
<b>EEZ</b>	Exclusive Economic Zone
<b>FAIR science</b>	Findable, Accessible, Interoperable but also Re-usable science
<b>FRB</b>	French Foundation for Research on Biodiversity
<b>IAC</b>	New Caledonian Institute of Agronomy
<b>IPBES</b>	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
<b>IRD</b>	French National Research Institute for Sustainable Development
<b>IUCN</b>	International Union for Conservation of Nature
<b>CR</b>	Critically Endangered (extremely high risk of extinction in the wild)
<b>EN</b>	Endangered (high risk of extinction in the wild)
<b>LMMA</b>	Locally-Managed Marine Areas
<b>MAB</b>	Man & Biosphere
<b>MEAs</b>	Marine Educational Areas
<b>NGO</b>	Non-Governmental Organization
<b>PIPA</b>	Phoenix Islands Protected Area
<b>PIURN</b>	Pacific Islands Universities Research Network
<b>RESIPOL</b>	Consortium for Research, Higher Education, and Innovation in French Polynesia
<b>SDGs</b>	Sustainable Development Goals
<b>SIDS</b>	Small Island Developing States
<b>SiSterrs</b>	Small Island States and Territories
<b>SPC</b>	Pacific Community
<b>SPREP</b>	Secretariat of the Pacific Regional Environment Program
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Isabelle Staron-Tutugoro is an artist, painter, and engraver from New Caledonia. Isabelle was born in Saint-Symphorien-sur-Coise, a village near Lyon (France). At the age of 22, she travelled to New Caledonia, fell in love with the colors and lights of nature, and decided to settle there. Her artwork is very inspired by Kanak culture and often depicts petroglyphs, Kanak bamboos, and Lapita pottery. The turtles engraving, chosen to illustrate the book, is inspired by a fact that marked the childhood of Isabelle's son. In Poindimié, at the end of the 1990s, turtles used to return to the same place each year to lay their eggs. Pre-schools and primary schools used to take children to feed baby turtles and educate them about the importance of protecting not only the species but also our lagoon. Then comes a series on the fishes of the lagoon and the geckos, which are symbolic animals (totems!) of New Caledonia.

*Cover photo credit : Pirogue, Pentecost Island, Vanuatu and Community garden, Pentecost Island, Vanuatu ©F. Cayrol/LabEx-CORAIL-UNC  
Rain forest, New Caledonia ©IAC/N. Petit.*

**Cipa pai picaapwi kârâ âboro mâ Göröpuu mâ Nâwië**

**Manaaki tangata, Manaaki whenua, Manaaki moana, kia kotahi whakahaere ki mua**

**Waa cèki cêré tò vèâ pâfâ Kâmö, Bwêêjë mâ Nêrhêë mâi**

**Tausia lelei o tatou tagata, laueleele, ogasami, malaga fa'atasi i le agaga e tasi**

**Ta'ofi ke ma'u fakatasi le Tagata, le Kele mo le Moana**

**Icaasikeune la itre atr, hnadro me hnagejë**

**Co aodeneni Ngome ne Rawe ne Cele**

**Strengthening connections between people, islands and the ocean in the Pacific**

**E hakatahi'ia to te Enana i te Henua me te Tai**

**Me vakaqacotaki na veiwakani ni tamata vata kei na nodra vei yanuyanu kei na nodra vanua kei na wasa liwa kei na kedra yau bula vakavolivolita na Pasifika.**

**Kraon, solwota mo pipol emi wan oltime**

**Kia vai kôrari noa te Tagata, te Henua e te Moana**

**E natira'a mana tô te ta'ata i te moana 'e te fenua**

**Tâ'ofi ke ma'u fakatahi te Ha'atagata, te Fenua mo te Moana**

**Me vakaqacotaki na veiwakani ni tamata vata kei na nodra vei yanuyanu kei na nodra vanua kei na wasa liwa kei na kedra yau bula vakavolivolita na Pasifika.**

**Ntano ngo ntas epei Namouriana**

**Maintenir unis les Hommes, la Terre et l'Océan**

**Buildim wan yunion wetem ol pipol, ol aelan mo solwara mo ol plant mo anamol long Pasifik**

**Ke fakamanlohiŋgi ange nŋae nŋanhi fehokotakiŋganga nŋo e kakai nŋo e nŋanhi nŋotu motu nŋo e Pasifiki pea mo honau nŋanhi fonuɔɔ, kae umanŋa nŋae moana, pea moe menŋa monŋui kotoa pe nŋoku iai.**

**Waa cèki cêré tò vèâ pâfâ Kâmö, Bwêêjë mâ Nêrhêë mâi**



# BIODIVERSITY, A PRESSING NEED FOR ACTION IN OCEANIA

Noumea 2019

Edited by Claude E. Payri and Eric Vidal

The planet's biodiversity is in danger! This unprecedented crisis is severely affecting the islands of Oceania, which are particularly vulnerable to the consequences of global change (warming, flooding, invasions, etc.). While the region as a whole contributes little to the climatic issues or even mitigates them, the Oceanian territories are strongly impacted.

The mobilization around the 2019 7<sup>th</sup> IPBES Plenary in Paris was an opportunity to promote the value of biodiversity and associated services in Oceania. While the conclusions of the Asia-Pacific chapter are clear, it is not too late to take action in this region where Man and Nature have developed very strong ties. To better understand the situation in these thousands of islands scattered over several tens of millions of square kilometers of ocean, a workshop dedicated to biodiversity in Oceania was organized in Noumea, New Caledonia, on the 24<sup>th</sup> and 25<sup>th</sup> of June 2019. This was a unique opportunity for seventy participants to discuss, debate and try to find solutions to face the seriousness of the situation.

This publication summarizes the main highlights and key messages of these two intense days of work, discussion and debate. It stresses the specificities of the biodiversity crisis in Oceania. Intended for decision-makers, but also for a wider audience, this document has the ambition to make the voices of Oceanians better heard on the international scenes dedicated to biodiversity and ecosystem services.



ISBN: 979-10-91032-09-4



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