

Atolls and climate change: Strengthening resilience

CLIMATE CHANGE AND
THE PACIFIC ATOLLS: A
COMPARATIVE STUDY OF
SOCIO-ENVIRONMENTAL
RESILIENCE (THE TUAMOTU
AND KIRIBATI)¹

The Pacific atolls share common rather than divergent climate change issues in terms of addressing a whole host of risks. Their development model will need to reconcile the resilience of local societies with that of the modern State, with a strategy that is more respectful of the particularly fragile environment of lagoons and coral reefs.

At just a few meters above the waves, the atolls or low-lying coral islands surrounding a lagoon are one of the areas the most exposed to the many consequences of climate change (rising water levels, lagoon erosion, but also ocean acidification and land salinization, changes in rainfall patterns, etc.). Most of these 400 or so coral islands are located in the Pacific: almost 80 in the Tuamotu Archipelago alone, constituting the world's largest group of such islands, in French Polynesia, while independent English-speaking States, such as Tuvalu and Kiribati, in Micronesia, are exclusively made up of atolls. Population density remains highly variable from one of these islands to another, but most have been inhabited for centuries. Their populations are among the most resilient in the world, within a natural environment which they have managed to exploit, while respecting it, but which is now threatened. Their past experience is today highly instructive for the future.

In this context, and in advance of the COP21 Conference, in 2015, AFD commissioned a multidisciplinary, though anthropologically focused, study from the Moorea Center for Island Research (CRIOBE) and University of French Polynesia (UPF). Over the long term, it aimed to identify and compare the determinants of the socio-environmental resilience of the Pacific atolls, whose situation is different from an institutional and cultural point of view (officially Francophone/Anglophone countries), yet similar in terms of their natural resources, settlement and history. The objective was to examine the measures taken for adaptation or to safeguard the natural environment, biodiversity preservation, and the exploitation of economic potential (from agriculture, fishing and services, particularly those related to tourism) by the inhabitants of the atolls.

¹ This text summarizes the analyses of Bambridge, T. and J-P. Latouche (Eds.), 2017, Les atolls du Pacifique face au changement climatique. Une comparaison Kiribati-Tuamotu, Editions Karthala, Paris.

Three case studies were conducted, in the Tuamotu in the *communes* (municipalities) of Makemo and Hikueru, and in the Republic of Kiribati on the Tabiteuea atoll, as well as a more succinct study on the island capital, Tarawa. This field research was complemented by a synthesis of archaeological and historical knowledge on the relationships between the societies of these atolls and their natural environment.² The aim of all this research was to answer the following question: In the future, will the clearly apparent traditional resilience of the populations of the atolls, notably when confronted with cyclones, allow them to address the new challenges brought about by climate change?

Atolls and climate risk

The research conducted in the Tuamotu and Kiribati shows that there are common climate change issues, whereas their economic histories are different and their population densities very unequal (less than 20 inhab./km² in the first case, against over 100 in the second).

The climate risk varies in both cases. Transoceanic tsunamis cannot amplify on the very steep external cliffs of the atoll reefs, but these low-lying islands are highly vulnerable to practically all known forms of submergence (cyclonic and southern surges, overflowing of the lagoons, storm tides, etc.). Huge surges coming from distant Southern regions cause significant sea level variations in the lagoons. More particularly, they tend to affect more particularly islands and atolls located in the inter-tropical zones, such as the Tuamotu. Their impact is also modified depending on the orientation of surges, winds and atolls.

An intense cyclone may totally submerge atolls, with violent currents destroying all man-made structures and causing radical changes to the morphology of sites (Duvat, 2008). The archipelagos located closest to the equator (Kiribati, Tokelau) are not directly concerned by cyclones, but may be severely affected

by cyclonic surges, which spread over hundreds of kilometers around the cyclones, potentially causing total submergence. The Tuamotu are more exposed to these surges, but cyclonic activity is extremely irregular there and the past frequency of major events is low, particularly in the east.

The global rise in the sea level due to climate change, estimated at 1.2 mm a year between 1900 and 1990, is thought to have reached 3 mm a year between 1990 and 2010 (Hay *et al.*, 2015), which confirms the process is gaining momentum. Due to climate change, the variations which cause submergence (cyclones, distant-source surges, etc.) may experience modifications (change in the impact zone, frequency or intensity), which models still have trouble simulating in a reliable way.

Natural environment and human settlement

Within a general pattern of settlement on the atolls from the Northwest Pacific towards the Southeast, the first inhabitants of the Tuamotu would, a thousand years ago, have discovered vast forests with large trees maintaining moisture. They were inhabited by major bird colonies whose droppings combined with dead leaves and formed humus containing fertilizing phosphate on the coral ground. A plant cover and animal life consequently developed there, which was undoubtedly richer than under the current coconut groves, where the ground is exposed by the numerous fires associated with the exploitation of copra. In addition, due to their equatorial location, some of the Kiribati atolls also have a coastal mangrove vegetation, which is particularly resistant to the phenomena of former and current surges. In both the Tuamotu and Kiribati, one of the most common plants and most used by inhabitants was the pandanus, every part of which was exploited in daily life, while the forest humus fostered tuber growing in “taro trenches”, demonstrating an optimal adaptation to ecological conditions.

² In both archipelagos, fieldwork methods were developed for ethnology (non-directive interviews, observation), sociology (directive interviews and group meetings) and geography (GPS readings, spatialization of human and geographical information).

Over 100 inhabited atolls, i.e. 1/4 of the global total, are threatened by the impacts of climate change in the Pacific. The age-old resilience of their inhabitants has to adapt to these new challenges

Ancient atoll societies knew how to take advantage of marine and terrestrial biodiversity in order to adapt and be resilient to major climate change. Forests allowed water to be stored below the surface and provided people with shelter in the event of strong surges, such as those mentioned above. Another aspect of the resilience of societies on the atolls was related to their mobility. The light vegetal dwellings made of materials available on the atolls, which could be rapidly dismantled, gave human groups the possibility of changing where they lived when a coast proved to be too exposed to certain repetitive and regular environmental hazards. Furthermore, the matrimonial networks and inherent mobility of these societies of travelers allowed them to settle more or less temporarily in other atolls when they were threatened by famines and climate hazards.

Both an ecological and social upheaval

Since the early 19th century, the prolonged contact with Europeans has not only profoundly transformed the social organization of the inhabitants of the atolls, but also radically changed the local ecology, which has contributed to reducing resilience in the event of extreme climate change.

In the Tuamotu, in particular, Christianization fostered the permanent settlement of populations in a few villages and encouraged a copra economy. Coconut monoculture, in addition to the fact that it contributed to the disappearance of large forests, made soil less fertile and resilient by exposing it. This transformed ecosystem of the atolls no longer, as in the past, allows an effective management of freshwater lenses, or humus to be protected by large trees. The former natural protection against strong surges or against cyclonic events had already disappeared at the end of the 19th century, causing hundreds of deaths in certain atolls. The same went for the social organization, which was now less mobile as it was permanently settled in a few villages. Faced with coastal erosion and strong surges, these villages proved to have little resilience to climate hazards and, in recent history, have had to be displaced several times.

Two coexisting forms of resilience

Due to these developments, atoll societies have become much more dependent on external resources, in particular by importing food which requires non-

traditional forms of conservation. Everyday resilience is today related to the broader organization of sea and air rotations with administrative capitals and external production centres.

Two forms of resilience now coexist: the resilience that is part of the pre-European tradition of a socio-ecosystem based on a rational use of the biodiversity of the atolls, which remains dominant in Kiribati, but which is tending to decline due to a dual social and ecological upheaval; the resilience of another more recent system related to State institutions and a centralized administrative and technical organization, allowing continuous and emergency actions in the event of climate hazards (construction of cyclone shelters, dykes, etc.). The first appears to be associated with local ways of life which are gradually declining; the second, of “modernist” inspiration, is also more costly for States, by increasing their dependence on external aid.

Rethinking the development model of atolls

Faced with the multiple challenges of climate change, would the new system be destined to replace local practices, which are recognized for their socio-environmental resilience but are in decline? The study emphasizes that this is not the case. The new challenges of climate change are more than a mere evolution and call for a paradigm shift in the development of the atolls: in its analysis and design methods, its means, but also in its objectives.

The study has confirmed that a model focused on production, structurally leading to an environmental crisis due to a lack of attention to ecosystems, which is still shown through heavy infrastructure and high-carbon economies, should be abandoned. Consequently, adaptation to climate change on the atolls will need to take into account the new international standards and Sustainable Development Goals (SDGs), particularly those for environmental protection (SDGs 13, 14 and 15), which directly concern the Pacific region.

The global debate on “fragility/resilience” of ecosystems and societies also applies to the atolls, especially Kiribati, a country which has continuously been on the OECD-DAC annual list of “Fragile States” since it was created. However, – an apparent paradox – the study also shows that any “modernization”/externalization of the way of life in “rural” Kiribati, compared to the recent

 **FRANÇOIS GAULME**
*Anthropologist and Research Officer,
Research and Development Division, AFD*

developments in the Tuamotu, has become the example to follow, or rather to adapt to a holistic strategy to reduce poverty and inequalities on the atolls. Indeed, by applying the grid of the 10 DAC principles to address situations of fragility (of political and social origin or caused by the natural environment and disasters), and particularly the principles 1 (“Take context as the starting point”) and 2 (“Do no harm”), the present externalization of knowledge, as well as of operational responses to address local impacts of climate change, should certainly be reduced, with a need for central governments and their technical supports to give more recognition to the inhabitants of the atolls in managing their own destiny.

Sectorally, the scope of reforms that need to be implemented could combine the integration of local knowledge, the adaptation of public services (transport, education, health, water and sanitation),

climate developments, agricultural diversification, and a reorganization of the exploitation of marine resources, which form the basis of a traditional life, but are as much under threat today on this point as commercial pearl culture.

A holistic approach to the future of the low-lying Pacific islands, some of which face total disappearance or the exodus of their population due to the deterioration in living conditions, is also necessary. In this respect, the study has suggested creating an “Atoll Observatory”, for the Tuamotu at the minimum, which would be worthwhile extending due to the similarity of the situations between “Micronesia” and “Polynesia”; between the neo-traditional communities of an Anglophone State and the communes of a French overseas territory. The shared issue of access to fresh water is probably the clearest and most worrying example of such a situation. ■

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