**A contribution for the Cook Islands submission to the Convention on Biological Diversity**

**Akasusa forest restoration January & October 2018**

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Notes for Liz Munro_CBD 2020 submission_Kuki Airani

The Cook Islands is a Large Ocean State with an Exclusive Economic Zone of 2 million $km_2$ and only 241 $km_2$ of land spread across 15 islands, divided into a Northern (Pae Tokerau) and a Southern Group (Pae Tonga).

**Sea Turtles (*Honu*)**

Sea turtles are found throughout the tropical Pacific Ocean. *Kuki Airani* (The Cook Islands) usually has two species: Green turtle (*Chelonia mydas* EN) and Hawksbill turtle (*Eretmochelys imbricata* CR). It is possible that the Leatherback turtle (*Dermochelys coriacea* CR) could be encountered in the foreign industrial fisheries, because these are ocean migrants nesting opportunistically at suitable remote sites.

*Chelonia mydas* have been mentioned as nesting from all of the Cook Islands (Woodrom Rudrud 2010; White 2012) apart from at Rarotonga, which has destroyed much of its coastal zone with tourism infrastructure (White 2013). Hotels were built on sandy beaches; roads, light pollution, and people moving around at night mean there are no secluded, dark, places suitable for nesting females to come onshore. Rarotonga is an important marine habitat for juveniles: a ratio of 2/3 greens, 1/3 hawksbills (White 2013, but still true today). *Te Ara o te onu* is monitoring in-water sightings, working with NES.

Palmerston Atoll is the most important nesting site in the Southern Group. Egg-laying occurs on most motu (islets) during the Austral summer and is definitely seasonal. In 2012 the non-nesting period was 183 days (20th April-20th October). Estimated nesting effort is about 100 nests per annum (White 2012) and foraging green turtles and a small number of hawksbills are present in the lagoon and on outer reef.

The other Southern Group islands (Aitutaki, Atiu, Mangaia, Manuae, Mauke, Mitiaro & Takutea) have occasional nesting, depending on the availability of sand or coral gravel and suitable access from the sea. Egg-laying does not occur on every island in all years (White 2012). Aitutaki has ridge-to-reef surveys underway. (NES?)

Tongareva Atoll (09º South; 158º West) is the most important sea turtle habitat in the central South Pacific (White 2012, 2014, 2016, 2020; White et al 2020). It has year-round juvenile development (green turtle *Chelonia mydas*); frequent mating, and, very unusually, year-round nesting: eggs have been laid in every month since August 2014 (Table 1, White et al 2020). In most rookeries around the world nesting is distinctly seasonal, occurring only in the summer months. The main nesting beach is on an uninhabited motu (Mangarongaro): the nestable area is 8 km long and a few metres wide; it is highly dynamic, some years all the sand is stripped away but at present it is deep. In some years waves reach the back of the beach, so honu go into the forest to lay their eggs. Predators are absent (there are some feral pigs, but no nest has been disturbed since 2010). In-water visibility is usually poor due to suspended sediment. We have only seen 5 hawksills since 2012.

Table 1: Annual green turtle nest totals at Mangarongaro 2014-2019

| Year | 2014 | 2015 | 2016 | 2017 | 2018 | 2019 |
|---|---|---|---|---|---|---|
| Nests | 534 | 555 | 565 | 1374 | 1767 | 1030+ |

+ 2019 data are only to mid-September, but this was the biggest 9-month tally to date.

The other northern atolls support occasional egg-laying and provide turtle foraging grounds (White 2012; White and Galbraith 2013).

Manihiki has the fewest nests: the geology is challenging. The eastern motu Ngake is very long and rocky on the ocean side, so access is very difficult; dead turtles have been found stranded there. The south coast consists of many *ahua* (small treeless motu), which have narrow rocky shores at the ocean side and shallow, flat, sandier areas on the lagoon side ~ these often get submerged and are unsuitable for nesting. The best beach, on the west side near Tauhunu wharf, is used for sand-mining. Occasional nests are known (White 2012).

Nassau is used for nesting although it is very small. Being a coral cay it has no lagoon and the crawl across the reef top can be many metres long, as honu prefer nesting under vegetation (White 2012).

Pukapuka does support nesting. It is a dynamic habitat and the sand shifts, eroding and depositing. The north shore of Wale has a fringing lagoon providing easy access to the steep beach; the lagoonal south coast is flatter and can be inundated. Two other motu are used for resource-gathering & nesting occurs.

Rakahanga has good nesting beaches (south, east and north) but these are rarely used. There were 4 nests on the school beach in 2011; and White and Galbraith (2013) found 23 older ones during a survey of the entire atoll. It is a very important foraging habitat for adult female *C. mydas*. As Tongareva is only 350 km away these animals may also nest on Mangarongaro's excellent beaches.

Suwarrow is uninhabited but the land areas are small. It does support honu nesting (White 2012). The atoll is a national park managed by the National Environment Service, and has a warden outside the cyclone season. Juvenile hawksbills have been seen in-water.

So far in the Cook Islands there has been no reported nesting by *Eretmochelys imbricata*.

**Major threats**

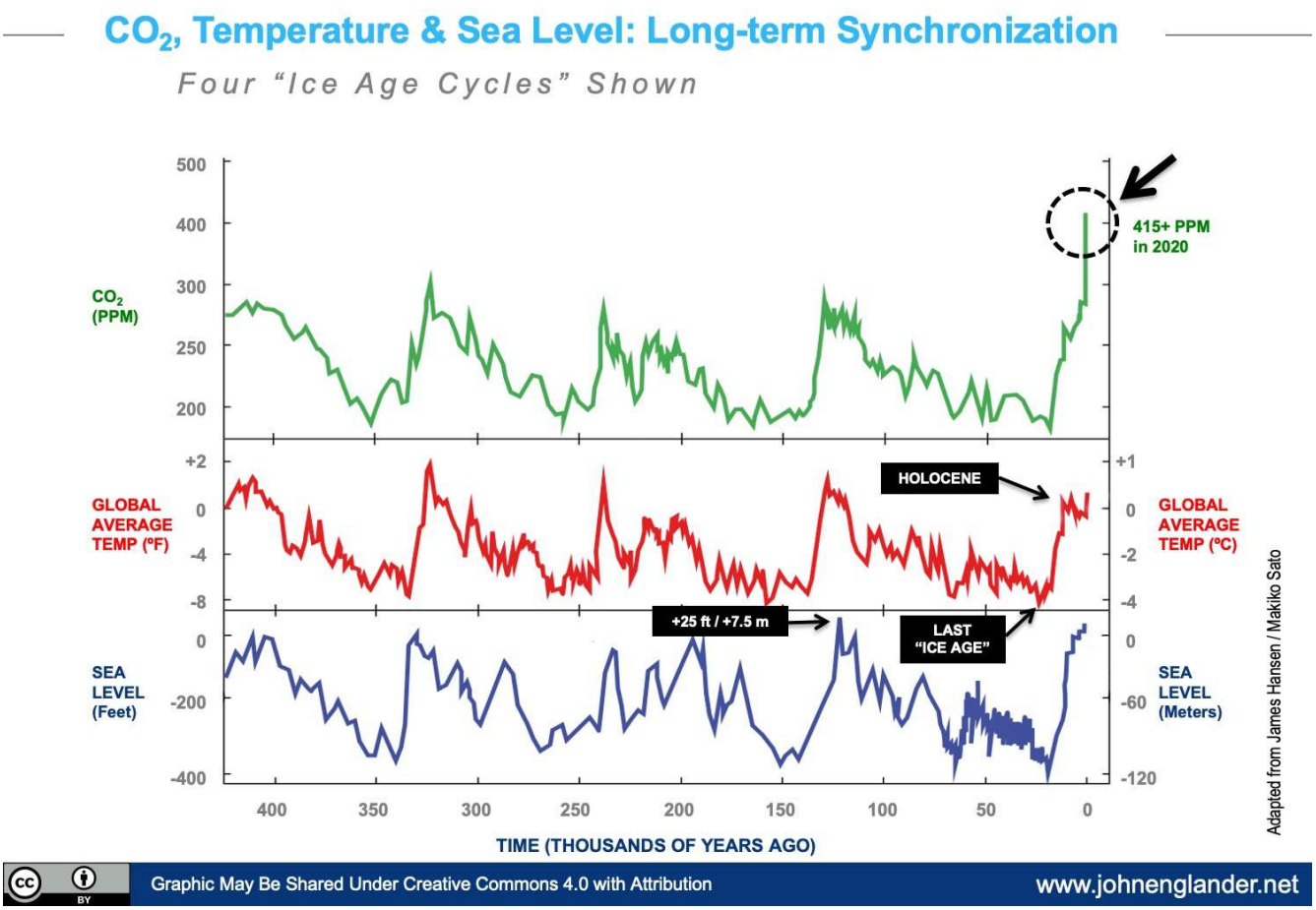
Anthropogenic climate change and global warming are probably sea turtles' greatest threat. The sex of embryos is determined by the nest incubation temperature: more females from warmer clutches, more males from cooler eggs. As global temperatures rise it becomes harder to produce males and projects around the world are reporting a feminisation bias.

Tongareva Atoll is the worst affected by climate change nationally (White 2016, 2017, 2019, 2020; White et al 2020). During the 2016 *El Nino* the lagoon water temperature was 38ºC for weeks, the nearshore ocean SST was 33-34ºC. The corals bleached and 95% of giant clams *Tridacna maxima* died (White 2016) [see also *acidification* Johnson et al 2016]. Many trees also died leaving the main nesting beach exposed to full sun all day long. In response Hakono Hararnga Inc. (HHI), our community environmental society, has planted over 6000 trees to restore the forest habitat (White 2020); partly funded by GEF-SGP.

We also promote low carbon living, including electric scooters, solar-powered tools, and a sun-oven. In addition we organised a Science Fair on Climate Change and awarded prizes & certificates to all school students. One startling finding was that *Te Kukupa* (police patrol boat) produces more greenhouse gases in a 10-day patrol than Tongareva Atoll does in a year!

Global atmospheric $CO_2$ concentration continues to rise, even with the 2020 Covid-19 pandemic forcing millions of vehicles off the roads and grounding planes: each of the last three years has seen an annual increase of 3 ppm. [31st May 2020 **$CO_2$ was 417.28 ppm** at Mauna Loa, Hawai'i].

The *deadly trio* of ocean impacts caused by climate change are: ocean warming, acidification and deoxygenation. During the last fifty years the ocean has absorbed about 90% of the excess emitted heat energy. This has several severe impacts: melting the cryosphere (permafrost, glaciers, sea-ice) which raises the sea level inundating low-lying coastal areas; coral bleaching (White 2016; Rongo 2016); and deoxygenation (warmer water holds less oxygen), which causes dead zones and species death. The ocean also absorbs about 25% of $CO_2$, forming carbonic acid, this impacts coral reefs in two ways: reducing the availability of carbonate ions (making reef building difficult) and dissolving existing carbonate structures (corals and shellfish). On the present carbon pollution pathway we can expect a temperature rise of 3-5º C and perhaps all the coral reefs will have gone by 2050.




Graphic from John Emglander showing clear link etween $CO_2$ concentration, temperature & sea level.

Industrial fisheries, especially on the high seas, are stripping the ocean bare. Apart from shrimp trawls in a few countries and some longliners, sea turtle bycatch is largely unquantified (IUCN Marine Turtle Specialist Group, 2020).

Seabed mining is an impending threat to the marine ecosystem. The SBM Act 2019 and the SBM Regulations 2020 do not refer to the Paris Agreement 2015, which is national and international law. It is a requirement to submit an EIA during the licensing process, so NES has an opportunity to demand a carbon neutral operation. Without this Kuki Airani will fail to meet its pledge of reducing GHGs 81% by 2030.

Marae Moana Act 2018 establishes a multi-use marine park across the entire EEZ. It allows industrial fisheries and seabed mining to occur. Buffer zones (50 nautical miles) now surround every island and prohibit industrial activities therein. The Act uses the *precautionary principle* in a strange way, seemingly to protect building projects from uncertainty about nature, instead of the other way around. Scientists understand it to mean *'the lack of scientific evidence should not permit actions to take place that are likely to cause environmental damage'*.


**17 Goals and 169 Targets**

**Agenda 2030: Transforming our World**

***HHI works with the following Sustainable Development Goals:***

Goal 13 ~ climate action: low-carbon living, carbon footprints, deep decarbonisation

Goal 14 ~ life below water: cleaning up oceanic plastics, coral health surveys, sea turtle research

Goal 15 ~ life on land: forest restoration, tree nursery, food sustainability, seabird surveys

Goal 4 ~ quality education: school field-trips, presentations, science fairs, life-long online learning

## Oceanic plastics

**Plastics are a huge problem in the global ocean, every coastline in the world is affected.**

**Accra, Ghana**

**Omoka Girl Guides Officers after a beach clean**

**Hakono Hararanga beach clean: we had a grant from Australian High Commissioner**

| | | | |
|---|---|---|---|
| 1 Public awareness | 6 Sustainable fisheries | 11 Protected areas | 16 Nagoya ABS Protocol |
| 2 Value of biodiversity understood | 7 Sustainable agriculture | 12 Species | 17 NBSAP revision |
| 3 Removal of perverse incentives | 8 Pollution | 13 Genetic diversity | 18 Traditional environmental |
| 4 Sustainable production / consumption | 9 Invasive alien species | 14 Ecosystem services | 19 Knowledge transfer |
| 5 Loss of natural habitats | 10 Climate change / ocean acidification | 15 Ecosystem-based carbon sequestration | 20 Resource mobilisation |

**The Aichi targets were supposed to be completed by 2020, clearly they have not been.**

Hakono Hararanga contributes to Targets: 1, 2, 4, 5, 8, 9, 10, 11, 12, 13, 14,, 15, 18 & 19.

We do good seabird research too: here is *Tapuku*, red-footed booby *Sula sula*

Tavake courtship. Red-tailed tropic bird *Phaeton rubricauda*

Kivi. Bristle-thighed curlew *Numenius tahitiensis* is present at Tongareva all year round.

***Our manu poster is at https://hararanga.org/downloads and includes notes in ReoTongareva.**

**And finally:**

Hakono Hararanga is well organised, with a comprehensive set of research and conservation activities in place. Our goal is to have a sustainable way-of-life, even as we face global problems such as climate change and biodiversity loss: passing on an abundant, sustainable ecosystem to future generations. Our girls are well-informed and interested, the boys much less so.

January 2019 bleaching at Akasusa with normal sea temperatures. Most likely due to increased u/v radiation caused by GHGs containing bromines and chlorines degrading the stratospheric ozone layer (White 2019).

**Two important notes:**

1. We contributed substantial data to Seminoff et al 2015. It is worth noting that Scilly Atoll in French Polynesia used to be the most important *Chelonia mydas* nesting site in the central South Pacific, but this may no longer be true. That review did not include Tongareva's continuous research since 2014.

2. Hunting of turtles and egg-harvesting has largely disappeared from Kuki Airani now: 35-40 years ago almost every nest was taken. Occasionally an adult turtle will be eaten, but these are opportunistic events (White pers. com.).

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