

• Protecting marine food systems against the decline of coral reefs

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Background

The Sustainable Development Goals highlight the economic, social and cultural ramifications of the sharp decline in fish populations as a result of global changes. Coral reef based socio-ecosystems are on the front line of these changes, as over 70% of their current surface area is under threat. Coral reefs are also vital sources of food, as the fish caught in these areas are diverse, rich in essential nutrients and of huge importance to many of the world's coast-dwelling populations. As such, policies are needed to protect coral reefs as local food systems, in order to: 1) safeguard diverse, nutrient-rich diets; 2) support these socio-ecosystems, which are among the most vulnerable in the world.

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Further reading

<https://www.ird.fr/voyage-au-coeur-des-recifs-coralliens>

Coral reefs: socio-ecosystems under serious pressure

Ecosystems all over the world are undergoing profound changes as a result of anthropic pressures on a vast scale. Coral reefs are among the most vulnerable ecosystems, severely affected by the impact of human activities. Rising sea temperatures are increasing the frequency and intensity of extreme weather events, causing tropical storms and heatwaves which can lead to massive coral die-off. The rapid decline in coral coverage and the accompanying loss of biodiversity are already plain to see in many parts of the world. And yet, the human communities living in proximity to coral reefs are often heavily dependent on the resources they offer for their food, their culture and their means of economic subsistence. Coral socio-ecosystems are thus extremely sensitive to the deteriorating health of the reefs, making them vital case studies for better understanding and engaging with contemporary sustainability challenges.

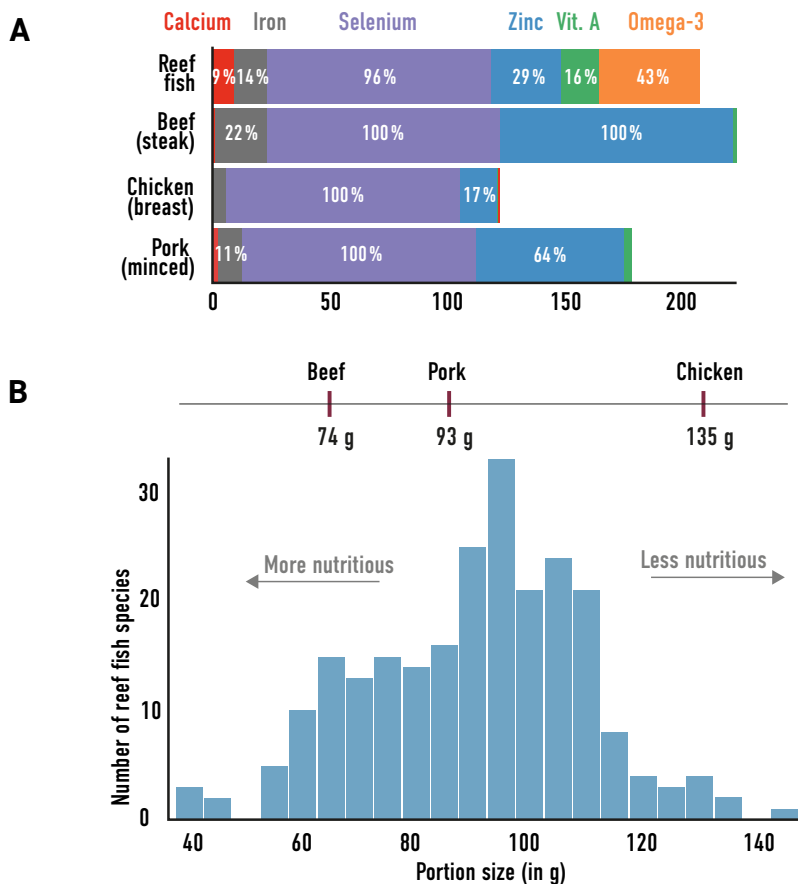
Coral reefs are home to a multitude of species packed with micronutrients

The incredibly diverse array of fish, invertebrates and molluscs which populate coral reefs constitute an important source of nutrition. Fish, like other foodstuffs of animal origin such as beef, pork and chicken, is rich in bioavailable micronutrients such as calcium, iron and vitamin A, often in short supply in the tropics. Compared with other foodstuffs of animal origin, reef-dwelling fish are particularly rich in

vitamin A, iron and Omega 3, as well as containing comparable concentrations of other key nutrients (fig. 1 A). A portion of 90 g of reef fish can provide a child with, on average, 33% of their recommended daily intake of six micronutrients, comparable to 134 g of chicken or 74 g of beef (fig. 1 B). However, compared with foodstuffs of animal origin derived from terrestrial livestock, limited to a small number of species, reefs are homes to hundreds of species of comestible fish, with micronutrient concentrations varying considerably from one species to the next. Just 40 g of the most nutrient-rich species can supply 33 % of an individual's daily dietary requirements, compared with 140 g for the least nutrient-rich varieties (fig. 1 B). Moreover, fish is generally more affordable and more locally accessible than other foodstuffs of animal origin. Furthermore, coral reef fishing communities harvest or catch a diverse array of species using a multitude of fishing techniques. Diets which include a greater diversity of animal species – from land or sea – tend to be richer in nutrients. This is partly due to the increased probability of consuming complementary nutrients, and the fact that different cultures combine seafood with different ingredients, increasing the overall diversity of their cuisine.

What does the future hold for coral reef fishing?

The global decline of coral reefs highlights the challenges involved in preserving local aquatic food systems. Data regarding the impact of climate change on coral reefs suggest that fish populations respond in various ways. The loss of coral cover often boosts seaweed



Nutrient contents of reef fish and equivalent values for foodstuffs derived from land-dwelling animals; comparison for 6 nutrients (calcium, iron, selenium, zinc, Vitamin A and Omega 3). (A) Nutrient density (shown as % of recommended daily intake of six nutrients) of a portion of 100 g of reef fish (average values for 239 frequently caught species), compared with beef, chicken and pork. (B) Portion size needed to provide 33% of the daily recommended intake of 6 key nutrients for a child between the ages of 6 months and 5 years, average for 239 reef fish species compared with meat from land-dwelling species.

reproduction, a boon for those species towards the base of the food chain which eat the weed. This enables parrotfish and rabbitfish, species frequently targeted by fishermen, to develop more rapidly, increasing their biomass and productivity. Recent studies suggest that many

species could adapt to the consequences of ocean warming in the short to medium term. With reefs likely to be home to less diverse communities of fish and less complex food webs, many small-scale reef fisheries are already pivoting to target those species which

endure in spite of the decline in coral coverage. Management systems could thus be adapted to take into account the fluctuating productivity of different species in response to climate change, for example by regulating their catches of species such as rabbitfish which feed on macroalgae.

What does this mean for local food policies?

Coral reef fisheries are essential to food security in many regions, hence the need for new policies to ensure that these local food systems can continue to prosper sustainably. To this end, we must begin by maintaining and supporting the diversity of these food systems so

that they do not come to be dominated by less nutritious alternatives. Measures could be put in place to promote “territorial” markets which prioritise local food over international commerce. Different approaches are also needed in order to guarantee the sustainability of reef fisheries as reefs continue to decline and consumer demand evolves. This might involve strategies which prioritise nutritionally vulnerable populations and promote traditional diets. More could be done to help fishing adapt to fluctuations in the populations of target species and changing dietary habits among consumers, for example measures to help fisheries update their fishing fleets, as well as efforts to adapt dietary habits to prioritise more resilient species and more sustainable fishing practices.

KEY POINTS

Coral reefs have long been studied for their important ecological, cultural and economic contributions. Nevertheless, the role played by coral reefs in local food systems, although often implicit, is less clearly understood. New policies are needed to protect coral reefs in their capacity as local food systems, and to ensure their sustainability in the face of globalisation, coral deterioration and evolving consumer demand. All of these adaptations are likely to vary considerably from one region to the next, and will require localised collaborations between scientists, managers and stakeholders.

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