

Food Security, Small Island States and Globalization: The Example of Seychelles

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Will the world be able to produce enough food for its increasing population? Is it realistic to expect that as many as ten, or even eleven, billion people can be fed by the end of the century? The question is certainly not new and is today a key issue on the global agenda – even more so given the shared experience of the Covid-19 pandemic. Of the many lessons that policy-makers will take from this ongoing episode, one is undoubtedly to look more critically at the workings of globalization. Will there be enough food in total and, crucially, can it be delivered to all who need it?

In the wake of the pandemic, nations are coming to terms with the fact that globalization cannot be taken for granted. Recent events have shown that supply lines can be more easily disrupted than was previously assumed. A key consequence of this is that the fundamental requirement of a nation to feed its population can no longer be guaranteed. This is not so much the case for a large nation like Australia – extending from a sub-tropical to temperate climate, and with extensive fisheries – where most supplies can be sourced from within its own boundaries. But for a small island state like Seychelles, which presently imports most of its food, and where there are limited opportunities to set aside more land, the pandemic has revealed an obvious vulnerability. A strategic response is required to address the problem, and a consideration of options – first, for small island states in general and then Seychelles in particular – will be explored.

Globalization: an imperfect model

Connectivity constitutes the defining characteristic of globalization (Eriksen, 2014). Not only through physical connections, whether in the form of air travel, container traffic or trans-continental railways, but also virtual links enabling immediate money transfers, live information flows and global media. Many of the nodes have long been in place but were only linked to form a cohesive network towards the end of the last century. Since then, it has been like a roller coaster where everyone was encouraged to jump aboard, not fully anticipating that there would be ‘downs’ as well as ‘ups’. Or, in the words of Thomas Eriksen, there is a dual aspect of globalization, with an inbuilt element of vulnerability as well as opportunity:

The compression of the world, in all of its forms, brings us closer to each other for better and for worse. The consciousness about these connections gives a sense of both opportunities and of vulnerability.

(Eriksen, 2014, p.5)

Certainly, warnings about this duality of globalization have been clear enough. The events of 9/11, for instance, demonstrated in dramatic fashion that global connections can result in harmful as well as benign outcomes. Later in the same decade, the global financial crisis of 2008 spread from country to country like a forest fire in dry tinder. And, most recently, Covid-19 has illustrated, once again, that globalization has inherent weaknesses – it is not necessarily the well-oiled machine that we have come to rely on.

Prior to the spread of the virus, warnings by frontline agencies and international bodies about providing sufficient food for the world's growing population were not sufficiently heeded. And, as if to avoid any hint of the discredited prognostications of the eighteenth-century English clergyman, Thomas Malthus (1798), specialists in the subject (for instance, Alex de Vaal, 2018, who dismisses Malthus's ideas as a 'zombie concept') have sometimes veered towards the opposite extreme. Given certain adjustments to society, they claim, with a degree of confidence not necessarily borne out by the facts, there can, indeed, be enough food for all. But are they right?

An important body of contemporary opinion (as shown below) maintains that it is perfectly possible to match the demands of more people with more food. Progress on the supply side, it is argued, can be made through a series of incremental steps, concentrating very largely on increasing the productivity of the many small farms in poorer countries. This approach is favoured by a number of leading aid agencies, working directly in the regions most affected, where they can see, first-hand, practical opportunities for improvement. 'Food Security: there is enough for everyone' is the confident proclamation of the German-based charity that is internationally known as 'Help' (Hilfe zur Selbsthilfe, 2020). Other major charities tend to adopt a similar approach, believing in their own capacity to make a difference. The International Federation of Red Cross and Red Crescent Societies, Foodtank, Oxfam, and War on Want all repeat (with or without variations) the same general message (Hardy, 2020). Likewise, account can also be taken of the ideas of the eminent Indian economist, Amartya Sen, who maintained that the problem which he confronted in the past century was not one of food supply so much as the purchasing power of all who need it:

*Starvation is the characteristic of some people not **having** enough food to eat. It is not the characteristic of there **being** not enough food to eat.*

(Sen, 1981, p.1).

This general belief (of agencies and intellectuals alike) that supplies can be increased to meet the rising demand generated by more people raises its own questions. The fact is that, even with the present population on the planet, there is already a serious food deficiency. In other words, if we cannot feed everyone now, how can we be so sure that we will be able to feed more people in the future? Highlights of a recent publication from of the UN's own agency, the Food and Agriculture Organization (FAO, 2019), endorse this point.

- *More than 820 million people in the world were still hungry in 2018, underscoring the immense challenge of achieving the [SDG] Zero Hunger target by 2030.*
- *Hunger is on the rise in almost all African subregions, making Africa the region with the highest prevalence of undernourishment. Hunger is also slowly rising in Latin America and the Caribbean, while Western Asia shows a continuous increase since 2010, with more than 12 percent of its population undernourished today*

(FAO, 2019, p.xiv)

In contrast with hunger in some parts of the world, elsewhere in developing economies there is the paradoxical situation of a growing incidence of obesity. This occurs where people are actually eating more than they used to but, because the new food typically contains higher quantities of fat, salt and sugar, the nutritional value is invariably less. People are then prone to put on weight and are vulnerable to associated health problems.

For these different reasons, the United Nations' sustainable development target on food is still a long way off and, if anything, the gap is widening. With just ten years before its goals are due to be met, there is growing cause for concern. The target for 2030 is unequivocal: 'to end hunger, achieve food security and improved nutrition and promote sustainable agriculture' (UN, 2015, SDG 2). Yet there is little in the way of good news:

The world is not on track to achieve Zero Hunger by 2030. If recent trends continue, the number of people affected by hunger would surpass 840 million by 2030.

(UN, 2020, p.xvi)

Even since this latest warning, things have got worse. Thus, early in 2020, with the emergent impact of the Covid-19 pandemic, many borders were closed, quarantine restrictions affected internal movements and the holding of markets, and the cessation of international flights cut important supply lines. The FAO maintained, however, that 'globally, there is enough food for everyone' (FAO, 11 June 2020), an assertion based, in part, on the fact that worldwide cereal stocks were at that time high (Cremer, 2020). In fact, the UN organization bases its optimism not so much on present figures, but on the potential of a multi-pronged strategy designed to increase productivity – '20 interconnected actions to guide decision-makers' (FAO, 2018). By its very nature, however, a 20-point 'strategy' is unlikely to provide the laser-like focus that is needed to effectively tackle the problem. One might liken this less to a strategy and more to a scatter-gun approach.

The simple question, asked earlier in this paper, remains without a convincing answer: will there be enough food or, more specifically, enough food of acceptable nutritional standards? And, we can add, will it be distributed fairly? Against this background, the issue will now be explored with particular reference to small island states and, in particular, the Republic of Seychelles.

Are small island states a special case?

Food security, it is argued in the foregoing section, is a global issue. It cannot be achieved without balancing supply and demand in different parts of the world. But, like all global issues, generalizations cannot apply to all situations. Different aspects will impinge more on some nations than others. The nature and extent of local resources, the stability of the region, the state of the economy and income distribution, are all critical factors. What, it can be asked, is so different about small island states? Should they be treated as a special case? And should it be one special case or many?

In a number of ways, small island states are, indeed, different (UN-OHRLLS, 2020). Being small is the most obvious factor, their limited extent offering few opportunities to use additional land to produce more food. Because numbers are also small, it may be thought that population growth is not an important factor in increasing the demand for food. But everything is relative and, in spite of the fact that some small island states are recording a net decline in their population (as a result of people moving elsewhere in search of better opportunities), overall there is a steady rise in numbers. The annual rate of increase averages 1.3 percent annually, and with 65 million people living in these countries (UN-OHRRLS, 2015), year on year the *per capita* demand for food is growing appreciably. Moreover, the capacity of these nations to help themselves is limited. Local experts are few, and often those with most skills go abroad to work. And, critically, funds for much-needed investment, which could be used to introduce more advanced technologies, are not easy to source.

Against this backcloth, the issue of food security has to be confronted. According to definitions provided by the FAO, there are two levels of food insecurity, one severe and the other moderate. The former refers to a situation where food is in short supply and people are faced with extreme hunger. In contrast:

... people experiencing moderate food insecurity face uncertainties about their ability to obtain food and have been forced to reduce, at times during the year, the quality and/or quantity of food they consume due to lack of money or other resources. It thus refers to a lack

of consistent access to food, which diminishes dietary quality, disrupts normal eating patterns, and can have negative consequences for nutrition, health and well-being.

(FAO, 2019)

In most small island states, food insecurity is not (in relation to the above FAO categories) severe nor even, at most times, moderate, although there is the potential for the situation to get worse. And, as the 2020 pandemic has shown, in certain instances the situation can deteriorate very rapidly.

Food security in small island states is an urgent issue, but it is still climate change which takes priority. For at least two decades these countries have seen themselves as being especially vulnerable to the effects of climate change, and it is this which led to them forming their own representative bodies (listed later in this section). Through these various organizations, member states can articulate their claims on the world stage more effectively than if they were to do so individually. Their collective voice is more likely to be heard, a fact borne out by the UN's designation of 2014 as the International Year of Small Island Developing States (SIDS). During that year, 3000 participants attended the culminating event of the year's programme on the Pacific island of Samoa, focusing on issues that most concern small islands and leading to what is known as the Samoa Pathway (UN-OHRLLS, 2015).

The threat of climate change was at the top of the agenda in Samoa but food security was also acknowledged as a key problem. Various recommendations on this latter subject were made and were articulated in a subsequent FAO publication (2016). Thoughts of a pandemic were not then on the horizon but, given what would later happen, one of the most telling sections of the report pointed to the growing dependence of small island states on food imports. This trend is constant across all small island states, with imports in some cases exceeding 90 percent:

In SIDS countries, food imports, as opposed to national food production, are by far the largest source of food. In at least seven countries in the Caribbean, 80 percent or more of available food is from imports. Countries such as St. Kitts and Nevis import 95 percent of available food. In the Pacific, the Cook Islands import approximately 92 percent of available food. The trend is particularly alarming as the majority of SIDS Islands tend to depend more and more on food imports for their food availability (FAO, 2016).

With little in the way of purpose-built storage facilities, many of these imports are normally held in the back rooms of local stores, with an estimated supply, in many cases, of no more than four weeks (Seychelles Ministry of Fisheries and Agriculture, 10 January 2020). This, as we will see, was to become a critical factor later in 2020, when global movements of fresh food were blocked overnight, following the cancellation of international flights.

Another helpful overview is to be found in a recent book on the subject, *Food Security in Small Island States* (Connell and Lowitt, 2020). Although the case studies are limited to the Pacific and Caribbean and the findings preceded the pandemic, this edited collection is essential reading. It reveals important differences between small island states (even those within the same region), but perhaps it is not the differences so much as similarities which are most telling. From being largely self-sufficient in food, apart from trading with neighbouring islands, island nations have invariably become more dependent on international imports. As various authors in the book contend, this situation gives rise to two problems: firstly, the nutritional value of imported foods is often inferior to what was eaten previously and is leading to a variety of health problems, and, secondly, dependence on food imports adds to the economic vulnerability of, often remote and impoverished island states.

Other organizations and individuals have added their own analyses of the challenge of global food security, with a certain degree of commonality in what is suggested. With the support of the Australian Government, the World Food Programme combined with the Pacific Community to produce a well-marshalled report entitled *Food Security in Vulnerable Islands: A Regional Food Security Atlas of the Pacific* (World Food Programme/Pacific Community, 2018). While focusing on the Pacific, it paints a picture that will be familiar in small island states elsewhere too – one of people leaving the land and being seduced by ostensibly attractive but inherently unhealthy food products.

To take the argument a stage further, account can also be taken of the responses to the pandemic offered by each of the representative bodies for small island states. One of the three organizations, The Association of Small Island States (AOSIS), was quick to issue a statement expressing concern that progress towards the achievement of Sustainable Development Goals will, inevitably, be impeded (AOSIS, 2020). It was argued that the problems facing their member states are too big to be resolved on their own and a call was made for international cooperation and support.

In a similar vein, the United Nations agency for vulnerable nations (which includes but also goes beyond the category of small island states) has warned that the pandemic threatens to impact its members disproportionately:

... with potentially devastating impacts on human health, including through social and economic effects of the virus and containment policies through the months and years to come. The lack of domestic financial resources, high debt levels and fragile health systems presents an urgent challenge. What has emerged as a health crisis in the short term may well have far reaching impacts on education, human rights, food security and economic development in the long term.

(UN-OHRLLS, 2020)

At the time of writing, the third representative organization, the Global Island Partnership (GLISPA), has not issued its own statement on the crisis.

So, to answer the question at the beginning of this section, ‘are small island states a special case?’, one can accept that they experience a high degree of vulnerability. But there are also important differences between them. Reflecting the fact that they are not easy to categorize, the three member organizations have overlapping but also different membership lists. If one is to generalize on their distribution, there are between forty and fifty small island states in total and most occur in the Pacific and Caribbean, with the rest in offshore Africa and limited locations across the Indian Ocean. But how is one to compare, say, the smallest of all, Nauru (with a land area of only twenty-one square kilometres) with Singapore, with its population of nearly six million and an international reputation for its dynamic economy? Moreover, there are major contrasts in terms of food security, and in a recent survey it is Singapore which tops the international table for its resilience in this field (Economic Intelligence Unit, 2019). A closer look at Singapore’s food security, however, reveals that it relies heavily on produce from neighbouring Malaysia – its own market garden, just across the connecting causeway – and on an international network of suppliers. It is a notably well-organized nation but, because of its unique characteristics, it can hardly serve as a role model for other small states, most of which face more formidable challenges. The example of Seychelles, an archipelago in the western Indian Ocean, resonates more closely with most other nations in this category.

Seychelles: a matter of food insecurity

By way of introduction, the Republic of Seychelles was colonized first by the French and then the British, until it gained independence in 1976 (McAteer, 1991). Many people emigrated at the time of a socialist coup in 1977 (just one year after independence) and others have left since then in search of better jobs and lifestyle opportunities. As a result, the present population is still below 100,000 (World Population Review, 2020). Given its limited land area, it is in most respects a small island state, the exception being the vast expanse of sea in its territorial jurisdiction. Because of the dispersed nature of the archipelago, the Exclusive Economic Zone (EEZ) extends over more than 1.3 million square kilometres.

Seychelles imports most of its food. It is self-sufficient (indeed, an exporter) in fish but relies heavily on imports for at least 90 percent of agricultural products (Seychelles Minister of Fisheries and Agriculture, 2018). In spite of repeated warnings, even in the past decade this proportion has increased. Nirmal Shah, for instance, a leading conservationist in Seychelles, has been consistent in pointing to the looming problems of food insecurity and calling for what is already belated action:

As a small island society we have to sit up and take notice. Superimposed on the global situation there are certain endemic qualities that make Seychelles even more vulnerable than most. We are a small, sea-locked nation far from markets. This geographical reality combined with diminished agricultural activity, a growing up-market tourism industry and a liberalising economy indicate a far from rosy future for food prices in Seychelles.

(Shah, 2013)

This heavy dependence on food imports brings more varied products to the country than was known previously but – as the following section shows – it also gives rise to its own costs.

Risks of reliance

Food insecurity has become a national risk. Firstly, if – as has recently been the case – supply lines are disrupted, the range of produce on offer in the shops is inevitably affected. Temporary shortages in certain products occurred in the second quarter of 2020, although they could be regarded as no more than a source of inconvenience. Items which could not easily be produced locally were in short supply but, for those who could afford them, special air freight deliveries filled the gap. It is not so much that these limited shortages caused long-term structural weaknesses (as these were already there) but empty shelves exposed the gravity of the situation. Overnight, what had previously been treated by most people as an abstract issue became a reality. What, people began to ask, would happen if shortages were to last for longer and started to include essential items?

Secondly, shortages in the future, whether temporary or long-term, will have an obvious impact on prices. Even in the relatively short period of the pandemic, this was evident. Some traders took advantage of the situation by raising prices on existing stocks, but the real difference came about as a result of less favourable exchange rates for the Seychelles rupee. In a global market, a heavy dependence on imports means that the country has little or no control over the prices charged by overseas suppliers.

Next, related to the previous point, spending a disproportionate amount of the national income on imported food represents a significant drain on reserves of foreign exchange. Even in normal times, this is a factor to take into account. If, however, it occurs at the same time as the collapse of tourism – the main pillar of the Seychelles economy – the impact on foreign exchange reserves will be, potentially, catastrophic. Only through heavy borrowing on the international markets, combined with higher prices for imported items to dampen demand, could the pandemic storm be weathered. The longer-term implications have yet to be met (Central Bank of Seychelles, 2020).

Fourthly, the progressive increase in food imports that has been witnessed since 1993 (with the ending of one-party rule and the stimulus to overseas trade that resulted) has had mixed

outcomes. In the previous years of austerity, people might have dreamed of a time when the shelves would be full, and households could choose what to eat. Sadly, however, the reality has not lived up to expectations. Imported foodstuffs are often of poor quality and can be harmful to the health of consumers. This was recognized in an official report in 2013, which concluded that ‘the country is becoming nutritionally insecure’ (Government of Republic of Seychelles, 2013). Links were made in the report between the consumption of poor-quality food and a rise in the incidence of non-communicable diseases, like cardio-vascular complaints, diabetes and hypertension, all of which were often associated with a dramatic increase in cases of obesity.

Finally, what occurred over a period of a few months during the pandemic can be seen as a glimpse of what might happen on a permanent basis in the future. Dependence on overseas supplies will become more precarious. With more mouths to feed in the world, will the present suppliers from overseas be able to meet demands for, say, a staple product like rice? It is not impossible to grow rice in Seychelles but only on a small scale, far below what is needed. As a result, rice is imported from traditional rice-growing areas, mainly in south and south-east Asia. But, as these face increasing demands of their own, exports to countries like Seychelles will become far from certain.

Folly of nostalgia

In everyday conversation, people will often respond to the present situation with a nostalgic glance over their shoulders. We managed in the past, they will say, and so-called lifestyle ailments were the problems of the rich in other countries, not in our healthy islands where our relatives and neighbours often lived to a ripe old age. They are right, and also wrong. There are always lessons to be taken from the past but these are hardly sufficient on their own to shape a new approach, more resilient than the present one. The past contains many weaknesses as well as strengths. Nostalgia can never be a panacea for the future.

Seychelles is famously portrayed in modern tourist literature as ‘paradise’. This is justified in one sense, as the environment largely lives up to the imagery of a tropical idyll. But in other respects it was, and is, no more a paradise than many other places. In the context of the present debate about food security, the part that is favourably recalled is that more or less everything that was eaten was sourced locally, it was affordable, and, compared with present diets, very healthy. Fish was the mainstay of the diet, providing sufficient protein value, and in their garden plots people grew cassava and sweet potatoes for their carbohydrates, as well as pumpkins and bred (a local form of spinach, often used with fish in a soup), with perhaps a few chickens in the yard and a goat or pig. Bananas, mangoes and papayas were abundant, and tall breadfruit trees provided another source of carbohydrates.

If this sounds idyllic, there is another version of what it was really like. Most people recall the constant pangs of hunger, especially when their crops were not growing well. At best, the main meal of the day might have consisted of a watery soup with a few morsels of fish. Scrawny chickens scratched at the ground outside and would only find their way to the table for the Christmas lunch, to be shared by the whole family. One of the saddest outcomes today is that fish, which really offered a lifeline and which is still relatively cheap and widely available, is so closely associated with times of poverty that it is often shunned in favour of imported products. Young people, especially, invariably prefer to buy ready-cooked chicken, deep-fried in poor-quality oils, rather than the healthy products which sustained their parents. Nostalgia is a deceptive lens through which to view the past, and the fact is that there would surely be few who would choose yesterday's diet over today's.

Overcoming obstacles

There is a fine balance to be had. The present state of overwhelming reliance on imported food is (for the reasons given above) not sustainable in the long term. On the other hand, having had a taste of what the world can offer, the simple diet of the past would no longer be enough. A new balance has to be struck, one that will satisfy a spectrum of tastes and also conserve valuable foreign exchange. To achieve this, various obstacles have to be overcome.

The first is the obvious one that land is scarce and opportunities to extend the present growing areas are very limited. Although there are 115 islands, the total land area is only 457 square kilometres. Of this total, roughly half is protected for its conservation value (mainly forests and points of interest) and much of it is mountainous; of the rest, urban development and tourist accommodation each year consume more of the remaining space. It is estimated that only 6.5 percent of the land of Seychelles is available for commercial farming and even some of this is threatened by the sea encroaching onto the coastal strips; a programme to strengthen the sea walls provides only temporary relief, quite apart from the damage that is caused to the adjacent beaches.

A second challenge, also related to the geography of the nation, is that it occupies a tropical location, just a few degrees south of the equator. This leads to important limits on what can be grown in the open in these conditions. Popular items in modern diets, like potatoes (other than the sweet variety) and apples, cannot flourish in the tropics, nor can those vegetables which benefit from a period of cold weather. As a result of heavy rainstorms, topsoil is easily washed away and the underlying granite is never far from the surface.

A third problem is that each year there are more mouths to feed. Although the total population (classified in terms of citizenship) is still below 100,000, year on year it continues to grow. And, apart from permanent residents, there are two other groups that have an impact, adding to local demands for food. One comprises those people who are granted temporary residency,

usually in the form of work permits in sectors such as construction, hospitality, home carers, agriculture and fisheries. By the end of 2018 this number had reached 14,000 (ILO, 2018). With the start of the pandemic, however, many returned to their various homelands, where they could access their own countries' medical facilities. It is presently not clear how many will be granted new work permits but, given the part they play in vital occupations like hospitality and construction, it is probable that numbers will rise once again. Another element is the demand generated by tourists. On the eve of the pandemic, the annual number of visitors was a record 384,000 (Seychelles National Bureau of Statistics, 2020). Although most would have come to Seychelles for no more than a week or two, their aggregate demand for food of the highest quality will emerge again as an important factor in any strategy to increase local provision.

Finally, and in many ways the most critical, is the fact that predictions of what food is needed cannot be based on past trends. Subsistence farming yielded a limited diet but once people taste more varied foods, the daily menu will look very different. The genie is out of the bottle and will never return. A meagre portion of stringy chicken once a year is no substitute for a cardboard bucket of fried chicken, on sale every day of the week. Surely, this is the weakness of forecasts by the food aid agencies referred to earlier in this paper? In the face of a rapidly growing world population, it is not simply a question of providing more of the same but, instead, meeting the aspiring demands of new generations. Food security is a moving target, one that is constantly redefined in the wake of new social trends and more disposable income. More of the same is no longer an option. Unless this is acknowledged, new strategies will be out-of-date before they are even introduced.

Seychelles: is food security possible?

Stripped to its bare essentials, there are only three ways in which a small island state like Seychelles can hope to reverse the present dependence on food imports and improve the nutritional value of local diets. One way is by giving more support for traditional farming and improving local yields; a second solution is to develop a high-technology, smart farming approach that can add to what can be produced locally; and a third approach is to be more discerning about what is imported. These three options are not mutually exclusive and the best results will come if they are treated as part of the same overarching strategy.

Building on tradition

With the historic break-up of colonial-era plantations, until well into the last century most food continued to be produced locally, in small farms and gardens, with, later, a few larger units growing vegetables on a commercial basis. There were also some chicken farms but

these were largely squeezed out in the face of cheaper imports of poultry at the start of the present century. Meanwhile, there are few young people now who choose as a career to toil in the fields, as their parents might have done, and commercial farmers are forced to bring in foreign labour.

None of this, of course, has escaped the notice of recent governments and, if resultant plans and policies were alone sufficient to improve the situation, then Seychelles would already be enjoying food security. Visits have been made by experts from the FAO and there is support for various projects towards this end (FAO, 2020a). Learning from traditional farming practices, and the ability to adapt to changing conditions, is one repeated theme. From as early as June 2013, an agenda was set by the then government of Seychelles in the previously-mentioned policy document, *National Food and Nutrition Security Policy* (Government of Republic of Seychelles, 2013). Problems are openly recognized and there is nothing in this with which one would take issue, nor in the mission of the ministry responsible for food security, namely, to achieve:

A resilient and sustainable fisheries and agriculture sector that enhances food and nutrition security, contributes to economic growth and respects the natural environment.

(Seychelles Ministry of Fisheries and Agriculture, 2020).

Another landmark was a national investment plan for agriculture (Seychelles Ministry of Fisheries and Agriculture, 2015). Like the previous policy document, this, too, contained ideas with which one could not find fault, but in the event it amounted to more words and little action, failing in this case because it could not attract sufficient investment. In the candid words of the incoming Minister of Fisheries and Agriculture in 2018, ‘the investment plan was very ambitious but not much has happened since then’ (Seychelles Minister of Fisheries and Agriculture, 2018). More recently, in 2019, the Ministry produced two more documents, this time devoted to the future of the country’s abundant, but also vulnerable, fisheries (Seychelles Ministry of Fisheries and Agriculture, 2019).

To accelerate change on the ground, it is accepted that the priority now is to set more realizable targets. Three sets of products have been identified – poultry, pork and a range of vegetables which grow well (like lettuce, pumpkin and tomatoes) – with the aim of working towards self-sufficiency in these areas (Seychelles Broadcasting Corporation, 26 March 2019). In the wake of the pandemic, an import levy was introduced for poultry and pork, to narrow the gap between domestic and foreign prices and encourage greater consumption of home-grown products. Additional items can also be encouraged.

A different kind of stimulus takes the form of a government scheme to provide a limited number of smallholdings for young farmers (Seychelles Ministry of Fisheries and Agriculture, 2020). Governments, however, can only do so much and if there is not an incentive to invest

it is unlikely to happen. Seychelles is categorized as a high-income country and is no longer eligible for various sources of international funding that it formerly received. As a result, investment is most likely to be restricted to niche opportunities where reasonable returns are possible and sufficient to attract the private sector. One example of this is a well-funded project in the Val d'Andorre, on the main island of Mahé, where herbs and vegetables are grown through a hydroponics system (*Seychelles Nation*, 8 June 2018). On a smaller scale, local entrepreneurs are finding a new demand for organic products, and growers can also benefit from direct marketing through roadside stalls and regular farmers' markets.

So, in practical terms, what can all this mean for food security in Seychelles? The country is already self-sufficient in fish, the source of invaluable protein, and also eggs. Through concerted action on the part of the government and local farmers, it is not impossible that poultry, pork and a popular range of vegetables could also make an increased contribution (ideally working towards self-sufficiency in each of these products). But that would only be acceptable if it can be done sustainably, say, through enclosures in the forests for pigs and chickens to roam, as opposed to factory production methods. Free-range farming of this sort would support the government's sustainable development goals.

Being smart

In addition to increasing traditional yields, is there a different way to farm – one that will lead to greater yields and also appeal to young people as a career and a field for research and scientific endeavour? In short, the answer is 'smart farming', a new frontier strongly promoted by the FAO:

Smart Farming is a farming management concept using modern technology to increase the quantity and quality of agricultural products. Farmers in the 21st century have access to GPS, soil scanning, data management, and Internet of Things technologies. By precisely measuring variations within a field and adapting the strategy accordingly, farmers can greatly increase the effectiveness of pesticides and fertilizers, and use them more selectively. Similarly, using Smart Farming techniques, farmers can better monitor the needs of individual animals and adjust their nutrition correspondingly, thereby preventing disease and enhancing herd health.

(FAO, 2017)

The challenge for smart farming is to find ways to add significantly to the amount of food produced on and around the islands of Seychelles. To do this will require great vision and a willingness to invest but it is not impossible to contemplate success. Doubters in the scale of the challenge might wish to acknowledge the immense power of new technologies and human ingenuity in relation to the rapid emergence of electric cars, which have transformed the world car market in a short period. Against the no-less compelling backcloth of food security, why could a comparable process of radical change not occur in farming? Although still at an experimental stage there are various projects around the world which include features such as

‘vertical farming, hydroponics, aquaculture and renewable energy to produce year-round food’ (Chow, 2015). Some of these are still at an early stage of development but, given time and investment, they could well become important sources of nutritious food.

Under the banner of the Blue Economy, and given the expanse of the ocean within its jurisdiction, the sustainable use of the sea is an obvious area to explore (Michel, 2015). How much in the way of vegetable products can be harvested from the sea itself, in ways which do not detrimentally affect the health of the ocean ecosystem? Experimental pods already show that it is possible to grow certain herbs and vegetables below the surface, although these demonstration projects have yet to become commercially viable (McEachran, 2015). Another example is the concept of ‘floating farms’, which can be located offshore, close to areas of greatest demand (Chow, 2015). Finally, although past experiments in Seychelles have not been successful, the science of aquaculture is constantly advancing and items like shrimps (currently imported) could well be produced to meet local demand.

Meanwhile, on land, opportunities to make rapid progress are more advanced than largely unproven ideas for farming at sea. Given the small area available for farming in Seychelles, the idea of using information technology and a range of associated technologies is very attractive. Smart methods can make greater use of relatively small plots, using techniques that are already available. The main obstacle is presently a shortage of investment but this can change if the commercial returns are sufficient to attract new sources of funding. In a nutshell, smart farming replaces the timeworn judgements of small farmers with precision, reducing needless labour as well as increasing yields. Through scientifically-controlled irrigation systems, for instance, plants can be watered from a central control point. Likewise, the eradication of pests and calculation of optimum growing times can also be managed centrally. Smart farming is equally effective with stock management, which is especially relevant as Seychelles works towards a higher output of pork and poultry.

One of the most important benefits of smart farming is that it can attract a new generation of young entrepreneurs to a profession that has previously held little interest. The idea of spending much of their time in an air-conditioned control room, operating advanced IT systems, compares well to the traditional practice of working outdoors in hot and humid conditions. IT jobs are popular with young people in Seychelles and there is no reason why this new area of activity would not appeal. Presently, agricultural training in the country is at a basic level but all of that could change, with higher as well as new tertiary education opportunities. This could well become a model for other small island states, too, faced with a comparable challenge to produce more of their own food.

Too many miles?

For all the possible improvements in both traditional and new methods of farming, however, there will still be a demand for food imports. It would be unrealistic to think otherwise. Climatic constraints as well as a shortage of land for broadacre farming are obstacles that are not easily overcome. Rice, potatoes, grains and products that can only be grown in temperate conditions will continue to be sourced overseas. This situation may change in time, if ways can be found to overcome natural limits – or if consumer preferences change – but not in the foreseeable future. In this context, a realistic challenge is not to stop all food imports but to identify just how much the present volume can be reduced. That, in turn, will depend on how much local output can be increased.

Nor is this simply a question of volume, of reducing the country's dependence on imports, as there is also a qualitative aspect to be considered. To date, it would seem, in an effort to ensure that cheap food is available, that price has been the main concern of governments. However, a fundamental review of food imports is long overdue, taking into account measures of nutritional value and sustainability. One must also consider the reliability of different supply chains and the risk factors involved. In developing a more sustainable approach, it is suggested that the following considerations should apply:

- ◆ identify sources which reduce to a minimum the 'food miles' for each product. This will entail looking closely at a sub-regional, if not a regional network of suppliers;
- ◆ consider the factors in each of the exporting countries which can offer continuity over the long term;
- ◆ bring into the equation the sustainability of farming in the supply countries, including the use of organic methods of production where possible; and
- ◆ by adjusting tariffs where necessary, only bring into Seychelles those products that cannot be provided locally.

Food tomorrow

As the case of Seychelles illustrates, for a small island state it would not be realistic to think in terms of self-sufficiency in food; those days have long gone. But a significant reduction in imports would have many advantages – not least of all in saving on foreign exchange and reducing food airmiles. The question is: what would be a realistic and sustainable balance between the two, between local produce and food brought into the country? Government officials and other experts can probe the figures, but a good starting-point might be, say, a target of half the country's food to be locally sourced and half imported. That would be

sufficient to make a real difference to the nation's health and economic welfare, but it is also a realistic target.

Given the value of the fish catch coupled with existing farm and garden production (which, together, supply, at most, 20 percent of the country's needs), the extra required to be sourced locally would be about 30 percent of what the country presently consumes. This extra yield could surely be achieved through a combination of improving traditional yields and through smart farming and fishing techniques, as indicated in the previous sections. As a complementary adjustment, food imports would be reduced from a figure of at least 80 percent of present consumption to 50 percent, a reduction that should be accompanied by a more discerning strategy of buying from sustainable sources.

A 50:50 strategy would be clear to all and would enable priorities and yearly targets to be set. Without confusing the core message, there could be parallel efforts to reduce food waste (a global problem by no means confined to Seychelles) and to encourage overseas scientists and investors to contribute to innovations in smart farming in a tropical environment. One would anticipate, too, that the strategy would be of interest to other small island states that presently find themselves in a situation of heavy dependence on food imports. Small island states have shown that they can advance their common cause in relation to climate change. Working together on issues of food security would represent a next, logical step in coming to terms with another aspect of global adaptation in the twenty-first century.

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