Managing natural resources in the Pacific Islands*

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Introduction

Pacific Island Countries (PICs) are heavily dependent on natural resources and likely to remain so for the near future, making resource management an issue of critical importance for economic development. This chapter employs a simple neoclassical growth model to diagnose deficiencies in current policy regimes and suggest possible alternatives. Current practices in the exploitation of the regions mineral, tuna, and forest resources are used to illustrate problems and suggest possible policy interventions.

Resource dependence in the PICs, though diverse, is high relative to economies with similar levels of per-capita income. Table 1 shows both the diversity and extent of this dependence. For example, the average area of land available on a per-capita basis ranges from less than 0.2 hectares in Nauru to 13 in Niue. When the fertility and terrain of this land is allowed for, this diversity increases even further. The coral atolls such as Tuvalu are extremely poor in terms of agricultural land. The dependence on land given the large subsistence sector is already high in several PICs. Moreover the rapid population growth (exceeding 3 percent per annum in Solomon Islands and Marshall Islands) is increasing pressures on the meagre land resources in some of these countries.

In contrast to the small land resources, the exclusive economic zones (EEZs) of the PICs are considerable. These offer untapped wealth in the form of marine resources including

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the potential for mineral discoveries on the seabed, and therefore offer potential for economic development, if used wisely. As the data in Table 1 demonstrates, the PICs have EEZs that range from seven times the landmass in Papua New Guinea to in excess of 15,000 times for Nauru.

Natural resources dependence within the PICs is likely to increase within the short to medium term due to rapidly increasing populations in a climate of sluggish economic activity. More than fifty percent of the population is dependent on subsistence agriculture, this dependence – though declining – is not likely to fall quickly. Private industry will take a considerable while to establish and grow to provide employment for the bulk of the population. This chapter addresses one important issue of efficient use of natural resources for economic development by comparing current practice with the ideals drawn from a simple neoclassical growth model.

The rest of the chapter is structured as follows. The next section sets the context by providing a brief survey of the economic performance of and extent of resource dependence in the PICs. Section 3 presents a simple neoclassical growth model that treats natural resources as capital; such treatment provides conditions for efficient use of such capital. Three specific cases, for mining, fishing, and logging are considered next to highlight deficiencies in current resource management practice. Lessons for policy interventions and conclusion bring the chapter to a close.

Economic performance and resource dependence in PICs

The 14 Pacific Island economies are diverse on all counts except for their poor economic performance over the past two decades. The data in Table 5.2 shows that the 14 nations that comprise the countries of the South Pacific have considerable diversity in terms of a number of economic attributes. Population size ranges from a low of 2000 for Niue to in excess of 5 million for PNG. Per-capita GDP ranges from $US594 for Kiribati to $US6, 448 for Palau. Life expectancy is equally diverse; ranging from a low of 58.2 years in Papua New Guinea to 73 years in Fiji. Similarly, aid flows range from $US4, 814 per capita in Palau or around 75 percent of per-capita GDP to $US46 per capita in Fiji or around 2 percent of per capita GDP

Annual per-capita growth in GDP, taken over the 14-year period from 1982 to 1996 (a period for which consistent data from the World Bank are available) has ranged from a maximum of 2 percent for Papua New Guinea to less than one percent for Fiji, Samoa, and Vanuatu. Furthermore, the growth rates between years have gyrated wildly, in part because of weather conditions, including natural disasters such as cyclones, which determine agricultural production. Of late, political problems such as those in Fiji, Papua New Guinea, and Solomon Islands have adversely affected investment, led to out-migration of skilled and professional labour, reduced tourist arrivals, and in turn lowered aggregate income.

Resource dependence in all of the PICs is high. For example, more than half and in the case of Papua New Guinea four-fifths of the population depend on the subsistence sector. Agriculture and inshore fisheries account for more than half of total employment, while primary sector exports account for up to 93 percent of total merchandise exports. Exports of copra, fish, minerals, sugar, and timber remain the major foreign exchange earners, albeit in differing orders in the individual PICs. For example, the forestry sector in the Solomon Islands earned over US$8.5million in 1999, equivalent to nearly 50 percent of total national export earnings. The secondary and tertiary sectors of the economy often depend on inputs from the primary sector for their viability. For example, the large sugar milling in Fiji is totally dependent on sugarcane production while log exports from Solomon Islands are due to their rich and rapidly depleting native forests. The growing tourism industry in the PICs is due to the natural heritage, including the scenic beauty and lack of industrial pollutants. These resources, unless well managed, cannot be assumed to last indefinitely.

Population pressures are likely to exacerbate existing demands on natural resources. For example, rising village populations in Fiji are leading to demands for return of land either leased for agriculture or held by the state. Similar problems in Solomon Islands emanating from competition for land between the immigrants from the outer islands and the original residents of Guadacanal led to a civil conflict with catastrophic consequences for the national economy.

If these pressures on natural resource use are left unchecked, the current levels of output are not likely to be sustained for the foreseeable future. For example, there are widespread reports that current levels of logging in parts of Papua New Guinea and all of Solomon Islands are far in excess of their regenerative capacity. Similar claims are being made for the rate of harvest of one tuna species, the big-eye (see Petersen in this volume). Soil erosion and land degradation are lowering yields as well as clogging-up many of the river systems in many of the volcanic islands. Amongst the coral atolls including Kiribati, waste disposal into the lagoons is rendering the fish and shellfish caught there as being unsafe for human consumption (Duncan and Temu, 1997; Hunt, 1998).

In summary, many of the resource endowments of the PICs are fragile and therefore require careful management to ensure that their contribution to development is maximised. Here, natural resources are treated as capital within a growth framework to maximise net national product (NNP), the last being net of the value of resources liquidated in producing output.

Natural resources as capital

Treating natural resources as capital within a standard growth model allows derivation of necessary conditions for efficient resource use. Here, one such model (Hartwick, 1990) is used in making some standard propositions on management of natural resources. The case of exhaustible resources is considered first and ahead of that for renewable resources.

Consider optimal growth in an economy that maximises the discounted utilitarian utility function of the form

(1) $$\int_0^\infty U(C)e^{-rt}dt ,$$

where ρ is the social discount rate, t denotes time, C is the level of aggregate consumption, and U(.) is the aggregate instantaneous utility function, subject to the following two budget constraints

(2) $\dot{K} = F(K, L, R) - C - f(R, S) - g(D, S)$, and

(3) $\dot{S} = -R + D$.

Where *K* is the stock of produced capital, *L* the current labour force, *R* the current flow from stock *S* of exhaustible resources, *F(.)* is the aggregate production function for the manufactured output, *f(.)* is the current cost of resource extraction – defined in terms of the produced good – and *g(.)* is the cost of exploration – again defined in terms of the produced good. The marginal conditions, f_R and g_D, provide the marginal cost – in terms of the produced good – of extraction *R* and new discoveries *D* given stock *S*.

The current value Hamiltonian from this maximisation problem is

(4) $H(t) = U(C) + \phi(t)[F(K, L, R) - C - f(R, S) - g(D, S)] + \psi(t)[-R + D]$,

with ϕ and ψ being the two costate variables for the respective state variables $\dot{K}$ and $\dot{S}$. The solution to (4) is characterised by the following four conditions:

(5a) $U_C = \phi(t)$;

(5b) $F_R - f_R = \frac{\psi}{\phi} = g_D$;

(5c) $\frac{\dot{\phi}}{\phi} = [\rho - F_K] = \frac{\dot{U}_C}{U_C} \Leftrightarrow \frac{\dot{C}}{C} = \frac{[F_K - \rho]}{\eta}$, $\eta = -C\frac{U_{CC}}{U_C}$;[1] and,

(5d) $\dot{\psi} - \phi[f_S + g_S] = \rho\psi$.

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[1] η is the elasticity of marginal utility with respect to consumption.

In the context of this simple model, the above four conditions constitute the necessary conditions for efficient extraction of a non-renewable natural resource. The intuition for each of these four conditions that are necessary for maximisation of equation (4) is as follows. The first states that the marginal utility of consumption has to equal its shadow price. The second states the familiar result that rents from the resource are invested in regenerating the capital. This condition can be interpreted as the Hartwick-rule where resource rents are invested in finding new resources and/or in other income generating activities. We could expand this interpretation by allowing substitutability between types of resources and K such that this savings-rule ensures that the aggregate stock of capital inclusive of natural resources is protected from falling for this economy. The third condition shows that in steady state, the marginal product of produced capital is just equal to the social discount rate. The last condition ensures that the resource is extracted efficiently over time. This may be expressed as the asset equilibrium condition; the left-hand-side of the equality shows the appreciation in value from not extracting the marginal unit of the resource while the right-hand-side represents the opportunity cost of such a decision. This is a restatement of Hotelling's rule, which shows that the shadow price of the resource should rise at the rate of the discount rate plus the added costs from net depletion of stock. Resource rents exist in this framework due to the scarcity of the resource.

The above enumerated conditions provide the benchmark against which current practices of resource management can be assessed. The framework is later expanded to incorporate renewable resources and composite capital goods inclusive of all natural and reproducible capital; the latter assumption enables substitution between specific types of resources. Allowing for such substitution possibilities enables greater flexibility in achieving the condition stated as (5b) above.

We can also expand the framework to provide a means of calculating the net national product (NNP), i.e. net of changes in the stock of natural resources. Hartwick (1990) provides such a framework by using a linear approximation to $U(.)$ ($\cong U_C.C$) and condition (5a) to express the current value Hamiltonian in (4) as

(6) $$\frac{H(t)}{U_C} = C + \dot{K} - \frac{y(t)}{f}[R - D] = C + \dot{K} - [F_R - f_R][R - D];$$

where NNP is now the sum of consumption, investment, and changes to the net stock of the natural resource valued at its rental price. The national product, as depicted by equation (6), can be derived by subtracting the rents associated with the (net) depletion of the natural resource from its Standard National Accounts (SNA) counterpart. We report on one such attempt, for Papua New Guinea, in the next section.

In the case of renewable resources such as fish and forests, the analog to (6) is

(7) $$NNP = C + \dot{K} + \frac{U_E}{U_C}E + [\frac{U_E}{U_C} - f_E]\dot{Z},$$

where all terms are as defined above with E now denoting the rate of extraction of the renewable resource that directly provides utility, f_E is the marginal cost of extraction, U_E/U_F is the market price of the resource (fish) under competitive conditions, and $\dot{Z}$

denotes the increase in the stock of the renewable resource. Equation (6) is implemented in estimating the NNP for the PNG mining sector next.

Three specific examples of resource management in the PICs

i. The case of mining in PNG

Mining is a case of non-renewable resource extraction; this being consistent with the assumptions leading to the necessary conditions for efficient resource extraction as listed by the four conditions in equations (5a) to (5d) above. Papua New Guinea provides a good case to test adherence to condition (6) for three reasons: first, a case study (Bartelmus *et al*, 1993) employing an integrated environmental and economic accounting framework, as provided under the guidelines of the United Nations Statistics Office, is available; second, amongst the PICs, Papua New Guinea has the largest and most developed mining sector; and third, Papua New Guinea is regarded as the most progressive of the PICs in environmental management and conservation. On the last, the PNG constitution states that the country's "natural resources and environment are to be used for the collective benefit of future generations"; the extent to which such a condition has been fulfilled remains debatable.

As of 1999, revenues from exports of crude oil, gold, and copper amounted to 3.524 billion kina, equivalent to approximately 71 percent of total exports. For the decade commencing 1990, the country exported a total of 1.65 billion tons of copper and 541 tons of gold. Another 2.7 billion barrels of crude oil has been exported since production commenced in 1992.[2] This depletion needs to be taken into account in a comprehensive treatment of the national accounts. Such a treatment is given in Bartelmus *et al* (1993) who note on page 111 that "non-renewable and renewable or potentially renewable natural resources are suffering depletion and degradation, and the environmental quality of terrestrial and aquatic ecosystems is deteriorating".

The Bartelmus *et al* study come to the conclusion that depletion of natural resources in 1985 amounted to 74.1 million kina – this being equivalent to 31 percent of the sectoral value added while the corresponding figures for 1990 were 180.7 million kina and 47.8 percent (Table 7-6, page 117). When environmental effects are netted out together with the depletion of the natural resource, GDP for the mining sector for 1989 is reduced to 26.5 percent of the gross amount (Table 7-13, page 128). The large and growing resource sector, albeit amounting to liquidation of national capital, funded consumption that in most years has exceeded production. This last observation is consistent with that made in Hunt (1998) and is in sharp contradiction to the Hartwick rule as shown by condition (5b) above. Hence, mining in PNG has failed to transform its natural resources in alternative form of capital; the clear policy implication being that for sustainable development, such a transformation is necessary.

ii. The case of logging

Logging, particularly of native forests, though theoretically a renewable resource could be interpreted as intermediate between the extremes of non-renewable and renewable natural resources. While on the one hand, the native forests have the potential for

[2] This data has been derived from Bank of Papua New Guinea *Quarterly Economic Bulletin*, various issues.

regeneration, the time required for such regrowth (anything up to 100 years) and prevailing discount rates imply that this resource may, for all practical purposes, be considered as exhaustible. In other words, current trends in logging suggest that this resource has little if any chance of regeneration. Given the above, it is perhaps wise to consider forest resources and threatened species as being a finite stock that declines at the rate of extraction as shown by equation (3) above.

Condition (5d) can be rearranged to read as

(5d’) $$\frac{\dot{y}}{y} - r = f(f_s + g_s)\,.$$

In steady state, the discount rate is negatively related to the shadow price of the resource extracted. The discount rate, reflected in interest rates charged on funds invested in the domestic resource sector, now determines the price of the resource. In the case where the resource is of a homogeneous quality, higher interest rates lower investments in the sector by lowering the value of investments. In the more realistic case of resources of varying qualities, the higher interest rate leads to high-grading, defined as the process whereby the best quality resource is extracted first, since only the better quality resources (ie those with larger rents) satisfy condition (5d’) above. High interest rates over the recent past in several Pacific Island states due to a combination of macroeconomic stress, political instability, and/or in situations of insecurity of access to the resource have lowered investments in fresh resource discoveries as well as increased high grading from projects in operation.[3]

[3] See Chapter 12 of Garnaut and Ross, 1983 on ‘Economic stability and the timing of mineral investment, production, and revenue’ and Duncan, 2001 for the more recent case of a sharp decline in new investments in resource projects in PNG.

Logging in Solomon Islands over the last decade has been high despite falling world price for logs. Recent episodes of political and macroeconomic instability have led to logging well above the sustainable levels; this could be due to the higher discount rates together with the need for foreign exchange. A higher rate of high grading follows in such circumstances. The above is in contradiction with condition (5d) that states the efficient extraction path for the resource. The policy lesson from the above is that macroeconomic instability and insecurity of secure access to a resource will lead to inefficient extraction; such an outcome will be inconsistent with natural resource management for sustainable development.

Secure long-term access to native forests in the PICs is hampered by communal ownership often governed by traditional institutions where access rights to a particular forest differs between clans such that one clan may have the rights to hunt on the land, another may have the right to hunt and collect firewood, while yet a third may have the rights to hunt, collect firewood, and garden on the land. Such diffused and often undocumented rights create problems of open access providing little incentives for conservation of the resource. In such a situation, resource extraction proceeds at rates higher than what would prevail with secure and exclusive property rights, raising the chances of depletion - *ceteris paribus* - of an otherwise renewable resource. This is another manifestation of inefficient entry driven by resource rents in a climate of insecure property rights (*a la* Horstman and Markusen, 1986). Such entry dissipates all of the rents, depriving society of the scarcity values of the resource. In the context of PICs, Duncan and Temu (1997) note that "Assignment of the right to sign logging contracts to tribal chiefs or 'big men' has led to a situation where rights to harvest are granted by landowners in return for a pittance, in terms of their share of the revenue in excess of logging costs" (page 176). Sometimes side-payments, often illegal, enable extraction of part of the rents by some of the owners but this is at a cost of rent seeking and unproductive activity. The above outcomes result from a lack of clear property rights to forests, this in turn will fail to realise any of the efficiency conditions listed in equations (5a) to (5d) above. The policy implication from the above is that property rights have to be established as a prerequisite to better management of natural resources.

iii. The case of regional fisheries

Fisheries, particularly that for tuna by distant water fishing nations, exemplifies the case of renewable resource extraction. Much of the inshore fisheries in the PICs are for subsistence use. Sustainable use of this resource is attempted, and with mixed success, by a combination of state and local regulation, including those emanating from traditions.[4] Here, we confine our attention to tuna fisheries given its regional character, size in terms of its potential contribution to development, problems of open access, and participation of distant water fishing nations (DWFNs). Petersen in this volume provides a detailed treatment of governance issues in respect of tuna fisheries of the region; here the focus is on current practice vis-à-vis the ideals from the model presented in the last section.

The EEZs provide the PICs, as the coastal states, private property over a large span of the Pacific Ocean. Article 56 of the 1982 Convention on the Law of the Sea gives the PICs "sovereign rights for the purpose of … exploiting, conserving and managing natural resources, whether living or non-living…". But this leaves the issue of the rights to the highly migratory tuna species unsettled. Distant water fishing nations, the US in particular, have consistently argued that highly migratory species should remain international common property to be managed by international organisations, where both the coastal states and the DWFNs have significant roles. Article 64 of the Convention states that relevant coastal states should cooperate with DWFNs with the latter given the responsibility to assist in establishment of the so-called "Article 64 organisations" (Kaitala and Munro, 1993).

Given that the EEZs of the PICs stretch to the high seas, management of the highly migratory tuna stocks that move between the EEZs and the (contiguous) adjacent high seas poses several challenges for policy makers. The challenges include maximising rents from the resource, ensuring sustainable harvests, and maintaining cooperation both amongst the PICs and between the PICs and DWFNs as per Article 64. These challenges, together with a lack of capacity to enforce regulations within the EEZs of individual PICs, has seriously eroded private property rights to the resource. The ensuing lack of collective control over harvesting of tuna has the potential to lead to problems of open access where open access resources are characterised by collective ownership in an environment where the resource is exploited under individualistic competition. Such

[4] There are some exceptions where the resource has been degraded and in the extreme case, depleted. For example, recent measures of coliform contamination of water and shellfish in Tarawa Lagoon in Kiribati

institutional arrangements often lead to over-exploitation of the resource. More importantly, open access equilibrium by its competitive nature, leads to dissipation of all rents to zero[5] – this result is due to the free or open access to the resource which is equivalent to assuming a lack of (enforceable) property rights to the resource. Consequently, none of the conditions listed in equations (5a) to (5d) are likely to be satisfied leading to a failure to efficiently manage the tuna resource for sustainable development.

The economics of the management of such shared fishery resources offers several lessons to policy makers. For example, free entry into the resource leads to a dissipation of all rents and leads to exploitation above what would prevail under a monopoly. Such unrestricted access has the potential for crowding diseconomies, where the effort of one competitor raises costs of fishing to another, leading to waste of capital. Many models that try to capture the dynamics of a non-cooperative management of a shared resource consistently show that the results are akin to those from the 'prisoner's dilemma' game where the fishery is driven to the common bionomic equilibrium with all economic rents being dissipated away.

The above would suggest that cooperative management of tuna is the only sensible option. Modelling cooperative games where the DWFN and coastal states cooperate to ensure sustainable harvests via agreeing to a total allowable catch (TAC) based on scientific research, poses the added challenge to agree on a rent-sharing mechanism. The

shows levels in excess of acceptable standards (Biosystems, 1995).

[5] This is a restatement of the zero-profit condition.

application of the two-player Nash game with binding agreements and in the absence of side-payments will deliver rents determined solely by fishing effort with crowding diseconomies being a symptom. An alternative regime where the TAC is divided between the stakeholders on the basis of an agreed and transparent formula that then is traded in a competitive environment has the potential to satisfy all of the four conditions listed as equations (5a) to (5d) above.

Achieving efficient use of tuna resources given current position involves following the enumerated four steps and in the given sequence. First, a TAC is established on the basis of scientific evidence. Next, a formula for distribution of this TAC between the stakeholders is established. Third, the individual PIC's-share of the TAC is traded in a competitive market. A comparison of the above ideal with current practice is not too promising. On the first, there is little knowledge of sustainable yields with the rapid decline in two species of tuna, namely big-eye and yellow fin, suggesting that harvesting beyond regenerative capacity may already be a problem (see Petersen in this volume). The South Pacific Community (SPC) undertakes such studies, the findings of which are confidential. Access to tuna fisheries is currently given by individual PICs to their EEZs, a recipe leading to the outcome of the prisoner's dilemma game. Individual PICs monitor and regulate fishing effort as an instrument to contain catches to sustainable levels; this then exacerbates problems of under-reporting of catches and existing inefficiencies in use of capital (see Duncan and Temu, 1997 and ADB, 2000).

Some policy implications

Three specific cases of resource extraction - those for mining, logging, and fishing – have been used to illustrate the gaps in current practice against the ideals from a model that treats natural resources as capital. The general lessons on better management of natural resources from the above include the following.

First, property rights must be established such that competition delivers on condition (5a) where the marginal benefit of resource extraction is equal to the opportunity cost of such activity. Lack of clear and exclusive property rights in respect of several natural resources is likely to hamper the achievement of this basic and necessary condition for efficient resource use. Second, the rents from resource extraction must be invested such that the liquidated natural capital is transformed into an alternative from of capital such that the aggregate stock of capital of the community is protected from falling. The above constitutes the Hartwick-rule. Mining in PNG has failed to adhere strictly to this rule given that some of the resource rents have been consumed.[6] Indeed PNG compares favourably with other PICs in terms of management of resource rents, the recent squandering of phosphate reserves of Nauru being a good case in point. Last, condition (5d) states the efficient extraction path for a resource. As the ideal, it states that the rate of resource extraction should be determined by equating benefits of such extraction as reflected by the price of the resource against the costs of such extraction inclusive of costs of depletion. This, named the Hotelling's rule, is most difficult to implement for two reasons: first, forecasting commodity prices has had very little success; and second,

[6] The national accounts treat expenditure on education and health as consumption; these in the framework used here would constitute investments.

resource projects have long gestation lags before coming on stream. The most that the policymaker can do with respect to condition (5d) is to ensure an environment conducive to long-term investment such that incentives for efficient extraction of resources are maintained. Consequently, the persistent policy and political instability within several of the PICs is a serious impediment to better resource management.

Conclusion

This chapter has benchmarked current practices in management of mining, logging, and offshore fisheries in the Pacific Islands against the ideals set by a simple resource model. The analysis suggests large policy and institutional gaps that potentially can be rectified. For example, current practices suggest that liquidation of mineral wealth in Papua New Guinea has not been fully utilised to produce alternative capital as suggested by the Hartwick rule. This rule states that economic rents from exploitation of any natural capital should be invested in an alternative form of capital and possibly in one that gives an even higher return. Given that PNG is perhaps better than most of the PICs in resource management, it can be safely assumed that a lot remains to be done in terms of management of mineral resources within the region. A similar claim can be made for logging and tuna fisheries as well.

Additional considerations as those relating to uncertainties about resource stock sizes, extraction costs, availability of substitutes and new (more efficient) technology raise the need for additional information in better management of resources. The least the policy maker can do is to provide policy stability so as to encourage investors in resource projects to take a longer-term view on their investments. Furthermore, the presence of resources of varying qualities in an environment where prices reflect the scarcity values of the resource will ensure efficient use of the resource. Here, scarcity value reflects the real opportunity cost of acquiring an additional quantity of the resource; hence, if the resource has few substitutes, implying a high choke-price, the high price will ensure an efficient extraction path. The last follows from the Hotelling's rule as depicted in condition (5d) above.

The presence of externalities, including the social value of preservation of bio-diversity, the impact of native vegetation on soil fertility and erosion, and the amenity value of natural habitats drive a wedge between social and private valuations of natural resources including native forests. These add another further complications to the management of natural resources, but this issue is beyond the purview of this chapter.

Table 1: Resource dependence

Nation/ State	Land per capita (hectares)	EEZ ('000 km^2)	Primary exports/total exports (per cent)[f]
American Samoa[a]	0.31	390	na
Cook Islands	1.25	1830	77
Fiji	2.24	1290	27
FSM	0.53	2978	93
Guam[a]	0.35	218	na
Kiribati	0.98	3550	66
Marshall Islands	0.29	2131	37
Nauru	0.19	320	na
New Caledonia[b]	9.55	1740	na
Niue[c]	13.00	390	na
Palau	2.87	629	na
Papua New Guinea	9.26	3120	71
Samoa[d]	1.65	120	25
Solomon Islands	6.87	1340	92
Tokelau[e]	0.67	290	na
Tonga	0.73	700	71
Tuvalu	0.26	900	25
Vanuatu	8.34	680	69

Notes:[a] territory of the US; administered by the Office of Insular Affairs, US Department of the Interior; [b] is a French Overseas Territory; [c] self-governing in free association with New Zealand with Niue fully responsible for internal affairs while New Zealand retains all responsibility for management of external affairs; [d] this is by count on the map of the major islands; [e] is a territory of New Zealand; [f] this is the ratio of agricultural and mineral exports as a proportion of total merchandise exports which could be interpreted as proportion of non-manufactured merchandise exports – data for the latest year available. Sources: http://www.cia.gov/cia/publications/factbook/ and http://www.mpt.travel-guides.com/data/ncl/ncl.asp; Asian Development Bank *Key Indicators 2001*.

Table 2: Basic statistics on Pacific Island Countries (PICs).

	Population (000s)	Popln Growth (% per annum)	GDP per capita:, $US	GDP Growth (% per annum)	Adult literacy (%)	Infant mortality, per 1000 live births	life expectancy
Cook Islands	19	0.65	4521	n.a.	100 (1994-7)	25 (1998)	69 ((1991-3)
Fiji	825	1.24	1,982	-3.7 (1998)	92 (1995)	19 (1998)	72.7 (1998)
Kiribati	91	1.42	594	6.1 (1998)	97 (1999)	58 (1998)	60.9 (1998)
Marshall Islands	62	3.21	1,509	3.7 (1995)	91 (1999)	26 (1998)	62.8 (1994-7)
Micronesia, Fed St	118	2.03	1,841	0.3 (1999)	81 (1999)	28.5 (1998)	67.3 (1998)
Nauru	12	1.85	2,900	n.a.	90 (1999)	26 (1994-7)	60.8 (2000 est.)
Niue	2	0.90 (1994-7)	2,250	n.a.	99 (1991-3)	18 (1994)	66 (1994-7)
Palau	19	2.41	6,448	n.a.	98 (1999)	19 (1995)	71 (1996)
Papua New Guinea	4807	2.22	756	0.9 (1999)	72 (1995)	59.4 (1998)	58.2 (1998)
Samoa	169	1.43	1,255	1.3 (1998)	98 (1999)	25 (1998)	68.7 (1998)
Solomon Islands	448	3.14	712	4.0 (1999)	62 (1999)	22.2 (1998)	70.8 (1998)
Tonga	100	0.28	1,614	2.2 (1999)	95.9 (1991-3)	21.3 (1998)	70.6 (1998)
Tuvalu	10	2.69	1,215	n.a.	99.5 (1991-3)	29 (1997)	65.6 (1991-3)
Vanuatu	200	2.41	1,276	-2.0 (1999)	70 (1989-90)	35.5 (1998)	65 (1998)

Notes: The population figures are projections for mid-2000; population growth data is for 1999; GDP-per capita data is for 1998; the data on adult literacy rates are for the most recent year available as indicated in the parenthesis; and, [a] data for 1998, the most recent available. Electronic databases of the following organisations were used to extract the above data*: South Pacific Trade Directory*, UNESCAP, UNESCO, UNICEF, WHO, the *World Bank*.

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