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**ARE TROPICAL NEARSHORE FISHERIES MANAGEABLE  
IN VIEW OF PROJECTED POPULATION INCREASES?**

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When harvest levels of marine resources must be regulated, fisheries managers have a fairly standard set of tools to use, such as restricting the areas fished, gears used, or sizes of animals that can be kept. In the South Pacific, it is also recognized that traditional methods may provide relevant management options (eg, Johannes et al. 1993, Crocombe 1994).

Within the next decade or so, however, the effectiveness of these management tools may be overwhelmed by the explosive human population growth rate being experienced in many parts of the South Pacific today. The purpose of this essay is to stimulate a discussion of the potentially unmanageable impacts that may result from this population boom. The premises for this case are straightforward: (1) growth rates in the South Pacific are among the highest in the world today, and (2) natural resources on most small Pacific islands are very limited. It seems reasonable to suggest that these trends are on a collision course, leading to unsustainable harvests and habitat degradation.

In mid-1994, the South Pacific region supported 6.7 million people with an average growth rate of 2.3% per year (SPC 1994, SPREP 1994, UNDP 1994). This growth rate is faster than that currently occurring in most places elsewhere in the world (Fig. 1). A 2.3% growth rate may not seem alarming, but it means that there will be 154,000 new people added the South Pacific region next year alone. The year after that, there will be an additional 158,000 people, and so on.

Individual growth rates of Pacific island nations vary from a high of 9.5% in the Northern Mariana Islands to a low of -2.4% in Niue (Table 1). The median time for these populations to double in size is only 31 years. Projected yearly increments for each island nation are also listed in Table 1.

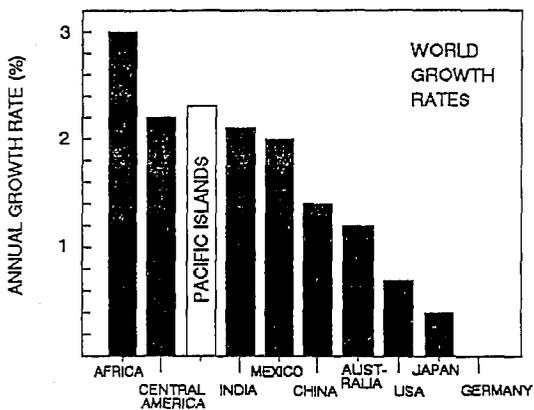


Figure 1. Average population growth rate for the South Pacific region (SPC 1994), compared to growth rates of selected other countries.

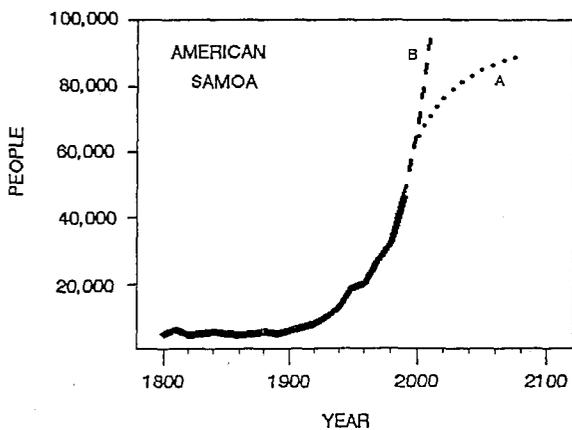


Figure 2. Population growth rate in American Samoa with projections with (A) and without (B) family planning (Craig 1995b).

Table 1. Population growth rates, doubling time, and yearly increases by Year-2000, based on observed growth rates in the 1980's (SPC 1994).

| Country      | Growth rate (%) | Population doubling time (yr) | Year-2000 projected population         | Yearly addition to population (Year-2000) |
|--------------|-----------------|-------------------------------|--|---|
| N. Marianas  | 9.5             | 7                             | 102,000                                | 9,700                                     |
| Marshalls    | 4.2             | 17                            | 71,000                                 | 3,000                                     |
| Am. Samoa    | 3.7             | 19                            | 69,000                                 | 2,600                                     |
| FSM          | 3.6             | 19                            | 133,000                                | 4,800                                     |
| Solomons     | 3.4             | 21                            | 457,000                                | 15,500                                    |
| Nauru        | 2.9             | 24                            | 13,000                                 | 370                                       |
| Vanuatu      | 2.8             | 25                            | 196,000                                | 5,500                                     |
| F. Polynesia | 2.5             | 28                            | 26,000                                 | 640                                       |
| Kiribati     | 2.3             | 31                            | 91,000                                 | 2,100                                     |
| Guam         | 2.3             | 31                            | 170,000                                | 3,900                                     |
| PNG          | 2.3             | 31                            | 4,581,000                              | 105,400                                   |
| Palau        | 2.2             | 32                            | 19,000                                 | 420                                       |
| N. Caledonia | 2.0             | 35                            | 207,000                                | 4,100                                     |
| Fiji         | 2.0             | 35                            | 885,000                                | 17,700                                    |
| Tuvalu       | 1.7             | 41                            | 11,000                                 | 180                                       |
| Wal. & Fut.  | 1.3             | 53                            | 16,000                                 | 200                                       |
| Cooks        | 1.1             | 63                            | 21,000                                 | 230                                       |
| W. Samoa     | 0.5             | 139                           | 169,000                                | 840                                       |
| Tonga        | 0.5             | 139                           | 102,000                                | 510                                       |
| Tokelau      | -1.3            | -                             | 1,400                                  | -20                                       |
| Niue         | -2.4            | -                             | 1,800                                  | -40                                       |
|              |                 |                               | Annual increase to region by Year-2000 | 177,630                                   |

American Samoa illustrates some impacts that a sky-rocketing growth rate can have on a small island (Craig 1993, 1995a,b). For centuries, American Samoa supported roughly 5000 people who obtained all of their food and other needs from their islands and adjacent marine waters. In the past 50 years, however, the number of people has increased dramatically in a classic out-of-control and potentially de-stabilizing manner (Fig. 2). At the present rate of increase (3.7%), American Samoa will double its population in only 19 years.

The current population level in American Samoa already far exceeds what the local environment can support. In 1993, for example, we imported \$182 million dollars worth of food, fuel, machines, building materials, clothing, etc. But like many other Pacific islands, we are unable to pay for these imports with locally produced resources. We do not have much in the way of saleable resources like timber, or a significant specialty service like tourism. Our economy is instead largely dependent on two sources, continuing federal aid and a single product (canned tuna) which is not actually a locally grown product but is transported here from elsewhere. Neither source of funds is stable and both will likely diminish in the not-so-distant future. Thus, American Samoa is in a vulnerable economic position, subject to world forces far beyond its control.

While attention to the population issue is urgently needed, a doubling of American Samoa's population seems unavoidable for at least two reasons. First, it will take time to change public attitudes about family size and birth control (at present, every female has on average 4.5 children). Second, a large proportion of the population (38%) are children who have yet to start families (EDPO 1994). If that group alone continues to have 4.5 children per female, the population will nearly double.

It seems unavoidable that grossly inflated populations will outstrip local resources, as has occurred in the Philippines (Pauly et al. 1989, Dalzell et al. 1991). With the economy unable to absorb much of the population increase, disadvantaged people can be expected to increase their subsistence take of all accessible resources, particularly agriculture on increasingly marginal lands and a daily scouring of nearshore marine resources.

This scenario, while perhaps overly simplistic, predicts a double blow to nearshore marine resources. First is a non-sustainable harvest, and second is a degradation of formerly productive coral reefs surrounding the islands. Anthropogenic effects, such as sedimentation and eutrophication from agricultural and urban areas, are already considered to be significant impediments to the recovery of Samoa's coral reefs (Craig et al. 1995, Saucerman 1995, Green in prep.). The public already perceives that local marine resources have declined

(Tuilagi and Green 1995).

Consequently, one cannot help but question whether it will be possible to achieve a sustainable harvest of any nearshore marine resource in the face of projected population increases. Should this view seem overly pessimistic, a glance again at Figure 2 emphasizes that the population growth will greatly impact tropical resources.

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