

A preliminary exploration of relationships among fishery management, food security, and the Millennium Development Goals in Melanesia

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Abstract

In this article I use the lens of the human development indicators (HDIs) to hypothesize scenarios for the relationships among food security, commodity fisheries and human development for Papua New Guinea, Solomon Islands and Vanuatu. Although the present low human population densities in these countries mean that food security, including subsistence fisheries, is largely intact, high rates of human population growth will likely pose threats to this security within three decades. A large body of research shows that educating women is the best way to slow human population growth, but education levels in Melanesia, particularly for women, are very low by world standards. I examine the potential and actual contribution to investment in education from commodity fisheries and other primary production sectors in Melanesia, and conclude that considerably more could be spent by both individual families, and the state, on education in this region.

Introduction

Melanesian nearshore commodity fisheries appear to be in crisis. A number of potentially lucrative export fisheries, most notably beche-de-mer, have recently been closed down by the governments of Vanuatu and Solomon Islands. It is likely that Papua New Guinea (PNG) will do the same next year. Overharvesting is widespread, and it is likely that stock collapses and recruitment failures are now a reality across large expanses of habitat throughout the region for some of the most severely depleted species, such as sandfish (*Holothuria scabra*), green snail (*Turbo marmoratus*) and giant clam (*Tridacna gigas*). Trochus fisheries appear to remain productive, but at very low levels compared with well-managed fisheries in parts of Polynesia and Micronesia (Foale 2005; Foale and Day 1997; Ramohia 2006; Amos 2007; National Fisheries Authority [Papua New Guinea] 2005b, 2007).

In contrast, subsistence fisheries, particularly coral reef finfish, appear, on average, to be in much better shape, and this is without doubt primarily because markets for these species are generally limited to regional centres. Indeed, around many of these regional centres finfish tend to be overfished as well (Cinner and McClanahan 2006; National Fisheries Authority [Papua New Guinea] 2005a; Sabetian and Foale 2006). A second reason for the healthy status

of coral reef finfish populations in Melanesia is that subsistence pressure is limited by the relatively small number of people in these countries. The nation states of PNG, Solomon Islands and Vanuatu share the distinction of having exceptionally low human population densities (14, 18 and 19 people km⁻², respectively). These low levels of subsistence pressure on both marine and terrestrial resources mean that most people enjoy a relatively high level of food security. The threat of "Malthusian overfishing" (Pauly 1994; Pauly et al. 2002) looms less large in this part of the world than in many parts of Southeast Asia, where population densities are up to an order of magnitude higher (280 and 117 people km⁻² for the Philippines and Indonesia, respectively). There are, however, a few densely populated places within PNG and Solomon Islands where threats to food security have been observed. In some cases high human population densities are supported by a range of economic activities, including traditional trading and commodity fisheries (Foale 2005).

Can fishing income improve human development?

Given that a significant proportion of the earnings from commodity fisheries would be surplus to subsistence needs for most people in PNG, Solomon Islands and Vanuatu, how significant a con-

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tribution is made by the income from commodity fisheries, past, present and future, to the Millennium Development Goals (<http://www.undp.org/mdg/>; Table 1)?

For the purposes of this discussion, I lump MDGs 2–6 into the broad category of “health and education”, and will focus mainly on these, and MDG 7 (“ensure environmental sustainability”). It is also important to observe that the MDGs, particularly 2–6, are essentially specific target levels for a range of human development indicators (HDIs), and that HDIs are summarized each year by the United Nations Development Program (UNDP) in their annual reports, as well as presented in full on their website in a range of formats (<http://hdr.undp.org/en/statistics/data/>). HDI data summaries are also available on the Gapminder (www.gapminder.org) website, where relationships between many indicators can be graphically represented on a highly accessible and instructive platform. The strong correlations between per capita income and life expectancy, infant mortality, fertility and literacy show very clearly that money buys human development. But the efficiency with which cash income is converted to improvements in HDIs depends to a large degree on effective and enlightened governance at all scales. Other important factors influencing human development include social cohesion (positively) (Kawachi et al. 1997; Putnam 1995) and economic inequality (negatively) (Marmot 2004; Wilkinson 2005).

In the context of fishing in Melanesia, two key challenges are immediately apparent:

- 1) existing data (see below) suggest that a significant proportion of the cash generated by exporting primary products, including commodity fishery species, is consumed instead of being invested in education, health, or other MDGs (i.e. an economic response something akin to “Dutch disease” or the “resource curse” [Auty 1993; Foale 2008]); and
- 2) although human population densities are not high at present, they are growing rapidly (1.9%, 2.4% and 2.6%, respectively for PNG, Solomon Islands and Vanuatu), and this rapid growth will increasingly threaten the sustainability of subsistence fisheries and food security generally, over the next three or so decades (Bell et al. in press). Table 2 shows some of the current human development indicators for PNG, Solomon Islands and Vanuatu, compared with the Philippines and Indonesia.

Table 1. Millennium Development Goals (MDGs)

MDG 1	Eradicate extreme poverty and hunger
MDG 2	Achieve universal primary education
MDG 3	Promote gender equality and empower women
MDG 4	Reduce child mortality
MDG 5	Improve maternal health
MDG 6	Combat HIV/AIDS, malaria, and other diseases
MDG 7	Ensure environmental sustainability
MDG 8	Develop a global partnership for development

Guaranteeing food security by educating women

The high rate of population growth is in itself an indication of major improvements in health (and other human development indicators) over the past 50 or more years, which have reversed the disastrous depopulation that occurred in the region following contact with European whalers and traders (Rivers 1922). But health and education services in this region are nevertheless very low by world standards. A quarter of a century of research has shown that educating women is the most effective way to reduce female fertility, and, in turn, slow human population growth (Jejeebhoy 1995; Sen 1994, Basu 2002). Investment in female education is something that is undertaken by both the state and by individual families. The state provides schools, teachers and curricula, while families are usually expected to pay fees to send their children to school.² However, in PNG, Solomon Islands and Vanuatu, poorly functioning government hinders the role of the state, while various cultural barriers apparently prevent families from playing their role in the national educational system.

A key challenge arises because most artisanal fishing is done by men who, according to a significant body of evidence, tend to have a lower commitment to spending on the health and education of their children than do women (Gibson 2000; Macintyre 2008a; McMurray et al. 2008). There is also a growing body of anthropological analysis demonstrating the importance of conspicuous alcohol consumption as an integral part of displays of competitive, modern masculinity in Melanesia (Bainton 2008; Macintyre 2008b) — consumption that frequently takes priority over school fees and medical expenses. However, despite the compelling nature of these arguments and data sets, obtaining reliable quantitative measures of spending patterns among fishers in the region remains difficult. Some of the best available data on spending by people surveyed in a fisheries-

2. There are non-state institutions, especially churches, also providing health and education services in the region.

Table 2. Human development indicators* for four countries within the Coral Triangle, 2007

	Papua New Guinea	Solomon Islands	Vanuatu	Philippines	Indonesia
Population density (people km ⁻²)	14	18	19	280	117
Population growth rate 2005–2015 (% year ⁻¹)	1.9	2.2	2.3	1.8	1.1
Per capita income (US dollars)	1869	1538	3225	2907	4006
Life expectancy at birth	57	63	69	71	70
Infant mortality (per 1000 births)	54	55	38	24	26
Fertility (total children per woman)	3.7	3.8	4.2	3.2	2.1
Female literacy (%) **	50.9	72	73	94	86
Primary school completion (girls) (%)**	50	59	91 [#]	100	100

* <http://hdr.undp.org/en/statistics/>

**2005 data

2003 data

related socioeconomic survey is given in the reports generated by the PNG National Fisheries Authority's Coastal Fisheries Management and Development Project (National Fisheries Authority [Papua New Guinea] 2005a). Household expenditure data from their northern New Ireland survey are summarized in Table 3.

Table 3. Summarized average household expenditure data, based on a sample of 600 households, from the National Fisheries Authority's 2005 socioeconomic survey in New Ireland Province, PNG.

Item of monthly expenditure	Proportion of household income used (%)
Fuel	23.3
Betelnut	18.4
Food	17.1
Alcohol	10.1
School	9
Wantoks*	6
Household	4.5
Clothing	3.6
Public transport	3.5
Church	3.2
Medical	1.2

* wantok is a term more or less synonymous with "relative," and is typically used in relation to the common Melanesian practice of demanding money or goods from relatives who are deemed to be capable of sharing. Such demands are rarely refused.

The following generalizations were made by this study:

1. The most commonly identified causes of social problems in the sample are alcohol (27% of problems) and drugs (20%).
2. While men and women were said to exercise similar levels of control over household income, men were said to control all of the money that was spent on alcohol.
3. The sample was strongly polarized on the subject of whether it was easy for children in their village to get an education, with the most important barriers to education identified as large distances to the nearest school, and high cost of transport, in addition to high school fees.
4. The average cost of educating children in this area was PGK 981 (USD 372) per household per year, while average income was reported as between PGK 485 (USD 190) and PGK 517 (USD 202) per month, depending on the context in which the question was asked.
5. 50% of households reported being able to meet the costs of education, while 17% said they could not (the remaining responses were "no answer", "sometimes", "don't know").
6. Fishing accounted for 13.6% of the monthly income on average for the households surveyed, which is significantly lower than employment and farming in terms of total income. However, fishing and farming were also identified as the two most common sources of income, indicating that income from fishing is more widely distributed in coastal communities than other sources of income (other than farming).

Overall, the data from the National Fisheries Authority's study show that a larger proportion of household income could potentially be spent on education (and health) than is currently the case, and that such a reallocation of spending would require a greater behavioral change for men than for women. However, it is also clear that these issues are impossible to dissociate from the broader context of social and economic change, and Melanesian gender relations (Macintyre 2008a, 2008b; McMurray et al. 2008).

Economic importance of artisanal fisheries relative to other sectors

As indicated in point 6 above, a key feature of artisanal fishing in Melanesia is that it is an economic sector accessible to a large proportion of the population. Most people in Solomon Islands and Vanuatu live on the coast, and, with some exceptions (especially on Efate Island in Vanuatu where most coastal land is now in foreign hands), the traditional rights that most coastal people claim over nearshore marine resources are recognized by the state. If managed well, the sector has the potential to provide a steady stream of revenue to many rural people. Despite the relatively egalitarian economics of artisanal fisheries, their overall contribution to the economies of these nation states is surprisingly small. In PNG, the mining sector dwarfs all other resource sectors in terms of export revenue, and in the Solomon Islands, the forestry sector currently accounts for about 70% of exports, with the industrial tuna fishery making up most of the rest. These two cases highlight the importance of the potential contribution by the state towards the MDGs, relative to that of artisanal fishers. The low level of service provision in PNG and Solomon Islands is really an indication of poor governance and the failure to divert revenue from lucrative exports into critical services such as health and education. However, there are interesting exceptions. New Ireland Province in PNG has benefited from a large gold mine in the Lihir group of islands for the last 11 years, and this year (2008) has finally managed to capture enough of this wealth to waive 75% of the school fee for all primary students in the province (Dr Nick Bainton, University of Queensland, pers. comm.).

Conclusion

The relationship between the artisanal fishing sector and the MDGs at present exists as part of a complex feedback loop, where human population density, fishery production (which is contingent on management effectiveness) and spending patterns influence the capacity for fisheries to con-

tribute to health and education. In turn, education influences population growth rates by its effect on female autonomy, which in turn determines the future pressures on both artisanal and subsistence fisheries. Management interventions at both state and community level have the potential to improve artisanal fishery performance, but the overall progress this promises for achieving the MDGs must be disentangled from the contributions that the other resource sectors — including agriculture, minerals, timber and tuna — make (or fail to make) towards the MDGs.

Finally, are the MDGs the best lens through which to study human development in this part of the world? Is happiness correlated with longevity, health and literacy? In this context, the global happiness index³ raises some interesting questions concerning the poverty-environment relationship. It posits a "Happiness Kuznets Curve", where the high HDIs in the richest countries have come at a disproportionately high environmental cost. People in rich countries have a huge environmental footprint, but while their HDIs are near the top of the range, they are not significantly (if at all) happier than people with slightly lower HDIs and considerably smaller environmental footprints. Since there is a strong correlation between per capita income and the health and education indicators, and since income in the Pacific Islands region derives mainly from primary resources, all of which are limited, this begs the question, how much improvement in health and education is enough, and how much can the region's resources provide? Finally, how much should the contribution to health and education from fisheries be subsidized by income from other resource sectors, or indeed from development assistance programs, and what can be done to change the spending patterns of both governments and fishers?

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3. http://www.neweconomics.org/gen/z_sys_publicationdetail.aspx?pid=2252006

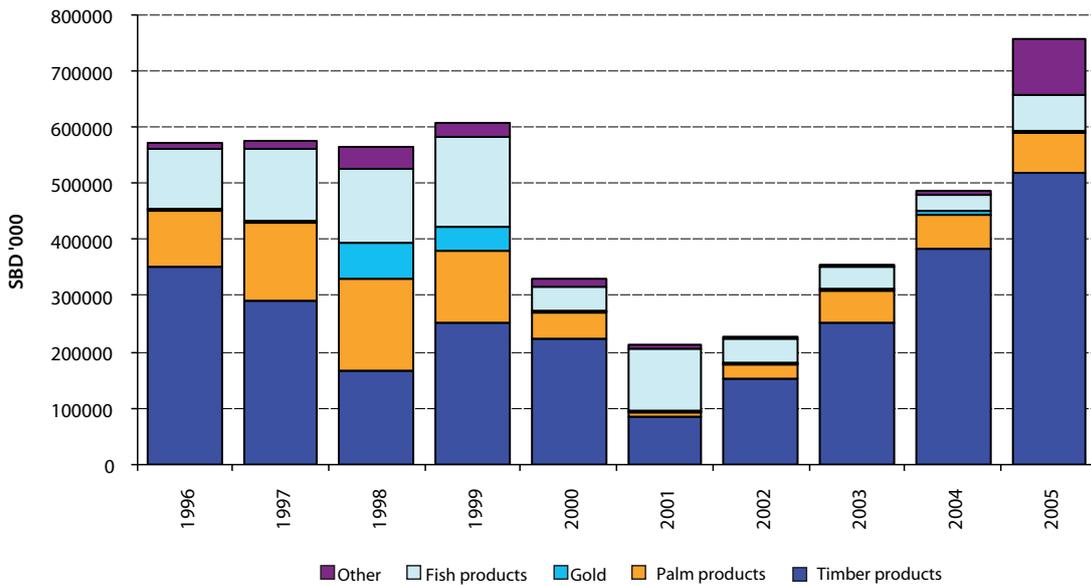


Figure 1. Solomon Islands export figures for the period 1996–2005. Export revenues were influenced by the coup that occurred in June 2000, and by the Regional Assistance Mission that began in late 2003. Data courtesy of Ross Andrewartha of the AusAID Forestry Management Project in the Solomon Islands. “Fish products” comprises mainly tuna; SBD 1 = USD 0.13.

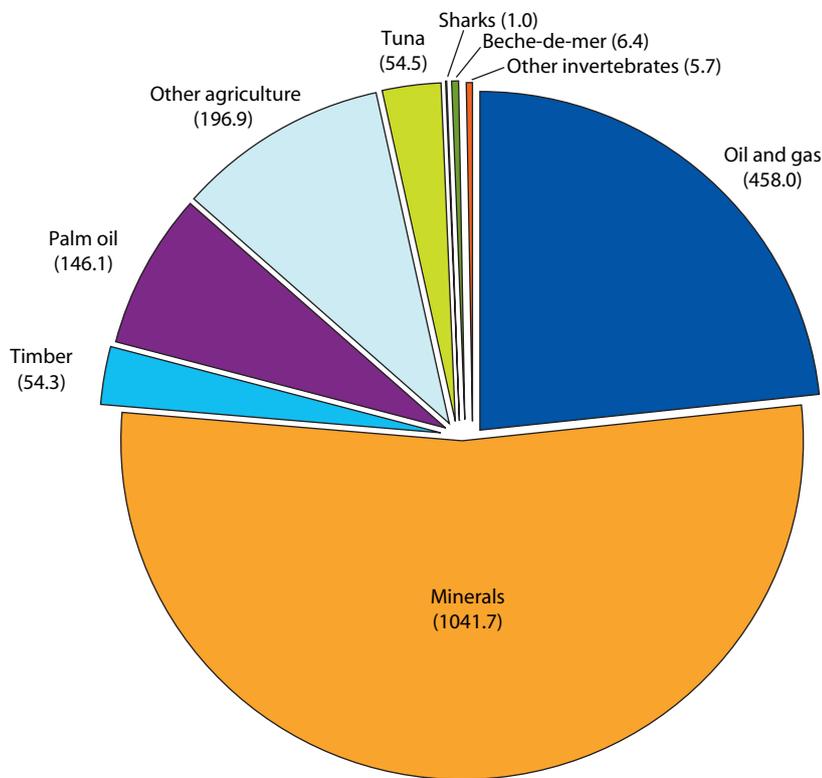


Figure 2. Main exports from PNG, 2003. Income from beche-de-mer reached over USD 11 million for the country in 2006, but the fishery is likely to be closed by the National Fisheries Authority for three years from 2009, owing to concerns about worsening damage to stocks from overharvesting.

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