POLICY BRIEF | 1865

Planning the Use of Fish for Food Security in the Pacific

RECOMMENDATIONS

1. Assess the potential of sustainable production from oceanic, coastal and freshwater fisheries and aquaculture to meet future demand for fish.
2. Identify how best to allocate access to these sources of fish.
3. Develop "vehicles" (or systems) for catching, producing and distributing fish to deliver allocations effectively.
4. Implement policies to support the necessary allocations and vehicles.
5. Strengthen simple community-based measures to keep the exploitation of coastal fisheries within sustainable bounds.
6. Monitor harvests to ensure that they remain sustainable.
7. Provide rural communities with dedicated access to coastal fisheries to create incentives for sustainable harvesting regimes.
8. Establish national fishery regulations, such as size limits, closed seasons and export bans, to underpin community-based management and prevent overfishing.
9. Promote awareness of how fishing communities depend on one another to maintain fish populations and the need for all stakeholders to manage fisheries cooperatively.
10. Expand small-scale pond aquaculture where freshwater supplies allow.

SUMMARY

Fish is the mainstay of food security in much of the Pacific. Forecasts of fish requirements in 2030 indicate that coastal fisheries will be able to meet demand in only a quarter of the island countries and territories surveyed. To ensure food security and meet minimum health requirements for fish, governments need to provide more local access to tuna and develop small-scale pond aquaculture. Diversifying fish sources will better enable rural households to cope with natural disasters, social and political instability, and climate change.

INTRODUCTION

Fish — both finned and invertebrate — is the mainstay of food security in the Pacific and the most important renewable resource in several smaller Pacific island countries and territories (PICTs). Pacific regional organizations stress sustainable management of fisheries but some basic questions remain unanswered: How much fish is needed to feed growing populations? How can it be supplied most efficiently? How many livelihoods can the fisheries sector sustainably support? How can fisheries best contribute to economic growth?

Rapid population growth in many PICTs demands urgent answers to these questions. Recent household surveys demonstrate that subsistence fishing is by far the biggest provider of dietary animal protein. Forecasts of the fish harvest required in 2030 to meet recommended per capita fish consumption, or to maintain current consumption levels, indicate that coastal fisheries will be able to meet demand in only 6 of 22 PICTs, even when well managed.

Better planning and policies are essential. PICTs need to know where the gaps will occur between future demand and supply and how to fill them. Governments should plan how to use fish to meet national food requirements by (1) identifying how much fish consumption per capita is needed for good nutrition, (2) estimating current fish consumption and identifying any shortfalls in recommended intake, (3) forecasting the future fish supply needed up to 2030, and (4) harmonizing the use and development of fish resources to optimize food security, livelihoods and economic growth.

Five strong patterns of current fish consumption emerge from surveys recently conducted in 15 PICTs: (1) Fish consumption is very high in Micronesia and Polynesia but below the proposed level in Melanesia. (2) Many rural communities depend heavily on fish. In

Women are heavily involved in many aspects of fisheries and aquaculture in the Pacific and need to be included in all decisions.

Polynesia and Micronesia, fish consumption in rural communities is as much as twice that of urban centres. In Melanesia, many coastal fishing communities consume as much fish as do their counterparts in Micronesia and Polynesia, but inland rural communities in Papua New Guinea and the Solomon Islands eat much less fish. (3) Rural communities in most PICTs depend heavily on subsistence fishing,

with 60-90% of fish consumed there caught by the household, and subsistence fishing accounts for more than half of all fish consumed nationally. (4) Fresh fish dominates the diet, often accounting for more than 80% of fish consumption in rural areas and more than 75% in urban areas. (5) Fish provides most dietary animal protein.

The predicted age and sex structures of future populations for each PICT, both rural and urban, can be used to forecast the fish needed for good nutrition in the years ahead. Limited scope for raising crops and livestock, a strong tradition of eating fresh fish, and the nutritional and health benefits of fish mean that many PICTs should aim to have fish provide about half of required dietary protein. This requires average annual fish consumption of 34-37 kilograms per capita. In Micronesia and Polynesia, this figure is often just half of the forecast of fish volume needed to satisfy expected demand, which is the more practical target (Tables 1 and 2). At the other extreme, the forecast for inland Papua New Guinea is based on providing only 5 kilograms of fish per person per year between 2010 and 2030, which is a goal that is both ambitious and responsible (Table 3).

The forecasts in the three tables provide PICTs with clear targets for maintaining food security. They also

Table 1. Forecasts of fish tonnage required in Micronesia to meet demand for good nutrition and to maintain current rates of fish consumption where they exceed the requirement for good nutrition

Country/territory	Year					
	2010		2020		2030	
	Nutritional base	Expected demand	Nutritional base	Expected demand	Nutritional base	Expected demand
CNMI[1]	**3,360**		**4,070**		**4,720**	
urban	3,200		3,920		4,570	
rural	160		150		150	
Guam[1]	**6,920**		**8,490**		**9,390**	
urban	6,550		8,120		9,030	
rural	370		370		360	
FSM	**3,820**	**8,250**	**4,180**	**9,650**	**4,550**	**9,920**
urban	870	1,670	1,050	2,000	1,380	2,510
rural	2,950	6,580	3,130	7,650	3,170	7,410
Kiribati	**3,480**	**7,730**	**4,240**	**9,050**	**5,040**	**10,230**
urban	1,790	3,500	2,500	4,780	3,290	6,080
rural	1,690	4,230	1,740	4,270	1,750	4,150
Marshall Islands[1]	**1,780**		**2,090**		**2,390**	
urban	1,210		1,490		1,790	
rural	570		600		600	
Nauru	**360**	**630**	**450**	**760**	**550**	**890**
Palau	**800**	**930**	**860**	**980**	**890**	**1,000**
urban	560		620		670	
rural	240	370	240	360	220	330
Total Micronesia	**20,520**	**29,600**	**24,380**	**35,090**	**27,530**	**38,540**

CNMI = Commonwealth of the Northern Mariana Islands, FSM = Federated States of Micronesia.
[1] Forecasts based on expected demand not possible for lack of suitable household income and expenditure surveys.

Table 2. Forecasts of fish tonnage required in Polynesia to meet demand for good nutrition and to maintain current rates of fish consumption where they exceed the requirement for good nutrition

Country/territory	Year					
	2010		2020		2030	
	Nutritional base	Expected demand	Nutritional base	Expected demand	Nutritional base	Expected demand
American Samoa[1]	**2,340**		**2,820**		**3,330**	
urban	2,180		2,670		3,180	
rural	160		150		150	
Cook Islands	**470**	**620**	**470**	**560**	**510**	**590**
urban	370		370		420	
rural	100	250	100	190	90	170
French Polynesia	**10,170**	**17,200**	**11,530**	**18,840**	**12,620**	**19,950**
urban	5,250	7,300	6,200	8,400	7,420	9,910
rural	4,920	9,900	5,330	10,440	5,200	10,040
Niue	**55**	**120**	**45**	**90**	45	**90**
Samoa	**5,990**	**15,180**	**6,380**	**15,210**	**6,840**	**15,600**
urban	1,400	1,920	1,730	2,280	2,270	2,970
rural	4,590	13,260	4,650	12,930	4,570	12,630
Tokelau[2]	**45**	**100**	**45**	**100**	**45**	**100**
Tonga[1]	**3,490**		**3,690**		**3,900**	
urban	880		1,110		1,440	
rural	2,610		2,580		2,460	
Tuvalu	**350**	**1,050**	**380**	**1,050**	**390**	**1,050**
urban	175	340	210	390	240	450
rural	175	710	170	660	150	600
Wallis & Futuna	**580**	**1,170**	**630**	**1,240**	**680**	**1,300**
Total Polynesia	**23,490**	**41,270**	**25,990**	**43,600**	**28,360**	**45,910**

[1] Forecasts based on expected demand not possible for lack of suitable household income and expenditure surveys.
[2] Expected demand based on average of neighbouring Kiribati, Tuvalu and Samoa.

pose key challenges for national planners: Where will the fish come from to supply the requirements? How can planners ensure that rural communities continue to be able to cost-effectively catch or produce fish themselves? How can growing urban populations be adequately supplied with fish without harming the resources needed for subsistence in rural areas?

The mission of the WorldFish Center is to reduce poverty and hunger by improving fisheries and aquaculture. In partnership with regional organizations such as the Secretariat of the Pacific Community, it strives to help PICTs implement the following policy recommendations.

POLICY RECOMMENDATION 1: Assess the potential of sustainable production from aquaculture and oceanic, coastal and freshwater fisheries to meet future demand for fish.

The distribution and abundance of tuna in the tropical Pacific, and how they are affected by El Niño, are increasingly well understood. This information allows PICTs to assess the sustainable catches of tuna available to them each year. For coastal fisheries, broad estimates of production have been pieced together for all PICTs from a variety of sources.

Table 3. Forecasts of fish tonnage required in Melanesia to meet demand for good nutrition			
Country/territory	**Year**		
	2010	**2020**	**2030**
Fiji	**30,000**	**33,200**	**37,500**
urban	16,000	19,500	24,200
rural	14,000	13,700	13,300
New Caledonia	**9,500**	**11,000**	**12,300**
urban	6,200	7,600	9,100
rural	3,300	3,400	3,200
Papua New Guinea	**111,400**	**142,800**	**182,300**
urban	31,500	46,500	73,400
coastal/riverine	59,900	72,600	83,300
inland	20,000	23,700	26,500
Solomon Islands	**18,000**	**25,500**	**29,900**
urban	3,400	5,400	8,700
rural	14,600	18,100	21,200
Vanuatu	**8,200**	**10,700**	**13,600**
urban	2,100	3,300	5,200
rural	6,100	7,400	8,400
Total Melanesia	**177,100**	**223,300**	**276,500**

POLICY RECOMMENDATION 2: Identify how best to allocate access to sources of fish.

Deciding how to distribute harvests from capture fisheries and aquaculture will require economic analyses to identify scenarios that harmonize and optimize food security, livelihoods and, in the case of tuna, economic growth. A particular challenge for managers of coastal fisheries will be reconciling the need to make fish available for subsistence in rural areas with the opportunities for rural livelihoods earned by supplying fish to burgeoning urban populations.

POLICY RECOMMENDATION 3: Develop 'vehicles' (or systems) for catching, producing and distributing fish to deliver allocations effectively.

In many PICTs, the vehicles for catching, producing and distributing fish have been in place for many years. They range from artisanal subsistence fisheries and small-scale coastal commercial fisheries to industrial domestic tuna fleets and associated canneries and loining plants. However, new vehicles may be required in response to projected shortfalls in supply or cost-induced needs to use one resource in preference to another to provide fish to urban or rural populations.

POLICY RECOMMENDATION 4: Implement policies to support the necessary allocations and vehicles.

As PICTs identify the paths to follow to provide access to adequate supplies of fish, new policies may be needed to change the ways fish is distributed. One way of providing more fish for rural consumption throughout much of the Pacific is to improve access to tuna, which most PICTs in the western Pacific have in abundance. Policies and vehicles to enable coastal communities to catch tuna more easily can

Subsistence fishing is by far the biggest provider of dietary animal protein in Pacific island countries and territories.

meet much of their future fish needs. Trials of low-cost, inshore fish-aggregating devices (FADs) in the Cook Islands and Niue show that the value of the fish harvested around them represents a return on investment of 500-700% during the life of a FAD. Another important feature of FADs is that they can produce food faster than any other local production system in times of great food insecurity, such as following a cyclone. The shelf life of fish caught around FADs can be extended by training villagers in simple processing methods such as drying and smoking.

POLICY RECOMMENDATION 5: Strengthen simple community-based measures to keep the exploitation of coastal fisheries within sustainable bounds.

The management of tuna is largely established in the Pacific through regional and international arrangements and treaties designed to sustain catches and share benefits. Pacific coastal fisheries have received much less attention, despite longstanding recognition that coral reefs are vulnerable to overexploitation and can rarely support market fisheries. The management of these subsistence and small-scale fisheries for food security must be strengthened to protect habitats and ensure adequate numbers of spawning fish to produce regular harvests. Community-based measures should include spatial management to protect spawning fish, appropriate size limits, and regulation of fishing gear including bans on night spearfishing with lights and the use of poisons and explosives.

POLICY RECOMMENDATION 6: Monitor harvests to ensure that they remain sustainable.

Useful indicators include changes in the (1) density of target species per area of habitat, (2) body size, (3) catch per unit of effort and (4) relative abundance of different trophic groups. Where information is lacking, PICTs should establish simple, inexpensive vehicles for collecting it regularly from communities and merchants. Adaptive management should address sustainability problems as they arise.

POLICY RECOMMENDATION 7: Provide rural communities with dedicated access to coastal fisheries to create incentives for sustainable harvesting regimes.

Support for applying local governance and imposing compliance on outsiders will involve, throughout much of the Pacific, maintaining or re-establishing customary marine tenure.

POLICY RECOMMENDATION 8: Establish national fishery regulations, such as size limits, closed seasons and export bans, to underpin community-based management and prevent overfishing.

Governments, nongovernmental organizations (NGOs), development agencies and coastal communities must understand that the amount of fish that can be harvested sustainably from inshore resources is often less than most people realize and that coastal fisheries should be used for subsistence in preference to livelihoods unless additional sources of fish become available. In some PICTs, restrictions on the internal sale and export of coastal fish will be needed.

POLICY RECOMMENDATION 9: Promote awareness of how fishing communities depend on one another to maintain fish populations and of the need for all stakeholders to manage fisheries cooperatively.

Interdependence stems from habitat connectivity in the life cycles of some species. Co-management and joint planning by fishery agencies, NGOs and communities should be promoted.

POLICY RECOMMENDATION 10: Expand small-scale pond aquaculture where freshwater supplies allow.

In PICTS with enough freshwater, including much of Melanesia, small-scale pond aquaculture can supplement household fish supplies. Key to establishing aquaculture for subsistence food security are identifying appropriate species and culture methods, minimizing effects on biodiversity, developing cost-effective feeds from locally available ingredients, investing in national systems for producing and distributing fry, training farmers, and reducing such barriers to entry as the high cost of constructing ponds.

CONCLUSION

Diversifying the sources of fish for rural communities by improving access to tuna and developing small-scale pond aquaculture would (1) expand communities' options for using coastal finfish resources, as valuable reef species could either be kept for subsistence or sold to buy storable food; (2) help communities restore overexploited coastal fisheries to more productive levels by transferring fishing effort to other resources; and (3) enable communities to adapt to climate change by switching to whichever resource or production system is favoured by prevailing conditions.

The need for tuna and aquaculture will not be great in PICTs whose coastal fisheries can meet future food requirements. For much of the region, though, these two vehicles should be launched as soon as possible and developed progressively to keep pace with local needs for food security and livelihoods. Successful implementation will require broad consultation with stakeholders and due consideration of gender issues. Women are heavily involved in many aspects of fisheries and aquaculture in the Pacific and need to be included in all decisions.

National fisheries agencies must allocate sufficient human resources to (1) manage and monitor the sustainable production of coastal fisheries, (2) decide how much of the national tuna catch to allocate for food security, (3) oversee the installation of inshore FADs in rural areas, and (4) extend existing methods of pond aquaculture to create a network of viable subsistence and larger-scale enterprises.

Many PICTs lack capacity and will need assistance. It is nevertheless clear that most PICTs have it within their grasp to provide access to enough fish for good nutrition or traditional consumption levels up to 2030.

Adapted from a collaborative study with the Secretariat of the Pacific Community and the Institut de Recherche pour le Développement: Bell JD, Kronen M, Vunisea A, Nash WJ, Keeble G, Demmke A, Pontifex S, Andréfouët S. In press. Planning the use of fish for food security in the Pacific. Marine Policy. doi:10.1016/j.marpol.2008.04.002

Diversifying fish sources will better enable rural households to cope with natural disasters, social and political instability, and climate change.

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