

Rent generation and dissipation in the Western Central Pacific tuna fishery

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Abstract

The governance of fish resources that migrate between or straddle different national EEZs is always complicated and often contentious. In the Western Central Pacific Ocean (WCPO) valuable tuna stocks are found in significant quantities in more than 12 national Exclusive Economic Zones as well as extensive high seas areas and are exploited by both local and distant water fishing firms using a variety of fishing techniques. The Pacific Island Countries and Territories (PICTs) that share these stocks benefit economically from the fishery through license fee revenues and from the landing of tuna for local processing generating employment opportunities in a region where chronic unemployment is prevalent and opportunities to increase national incomes few. This paper explores the characteristics of the fishery and its management that contribute to rent generation and hence benefit PICTs sharing the resource. It further describes aspects of the fishery that may lead to rent dissipation and a loss of potential benefits to PICTs. By comparing these rent generating and rent dissipating characteristics, the innovative aspects of the current management of WCPO tuna stocks that contribute most to rent creation can be identified while also identifying future innovations that will contribute to further rent creation. Characteristics unique to the WCPO tuna fishery are identified, as are attributes that may have broader application to the management of other highly migratory fish stocks.

The WCPO tuna fishery and the purse seine vessel day scheme

The WCPO tuna fishery is one of the largest and most valuable fisheries in the world. The biological productivity and the harvesting and marketing economics of this fishery are such that properly managed it can generate, on a sustainable basis, very substantial net economic income.

The WCPO tuna fishery is also one of the most complicated in the world. The tuna resources are spread over a huge ocean area and are found in significant volume in the EEZs (Exclusive Economic Zones) of more than 12 independent nations as well as the high seas between them. They are exploited by both local and distant water fishing nations and by very different types of fishing enterprises using a variety of fishing methods. They are also subject to Overlapping regional and sub-regional fisheries agreements and organization. These attributes of the fishery imply that it is also one of the world's most difficult to manage effectively.

The Parties to the Nauru Agreement (PNA) purse seine

The WCPO tuna fishery is the largest and the most valuable tuna fishery in the world (FFA 2015):

- 60% of 4.8 million tonne global tuna fishery (2014)
- 2.9 million tonne harvest is worth US\$ 5.8 billion (2014)

By gear type (2014)

- Purse seine - 2.1 million tonnes worth US\$ 3.2 billion
- Longline - 269,000 tonnes worth US\$ 1.7 billion
- Pole and line - 204,000 tonnes worth US\$ 400 million

By species (2014)

- Skipjack – 2 million tonnes worth US\$ 2.9 billion
- Yellowfin – 600,000 tonnes worth 1.8 billion
- Bigeye – 160,000 tonnes worth \$755 million

Vessel Day Scheme (VDS) is a partnership between eight Pacific state.¹ Their EEZs cover a large fraction of the distribution of the WCPO tuna resources, to install a management system for this fishery capable of conserving the resource and securing the flow of net economic benefits from the fishery on a sustainable basis. Given the complexity of the fishery and the number of nations involved, this may be the single most ambitious attempt of this kind seen in the world so far.

The VDS creates a common rights-based management system to conserve the resource and secure sustainable economic benefits PNA members agree on a limited number of fishing days for the year, based on scientific advice. Fishing days are then allocated to PNA countries and sold to distant water fishing fleets. Given the complexity of the fishery this may be the single most ambitious attempt of this kind seen in the world so far

Performance of the VDS

There is strong evidence that the VDS is successful. Under the VDS, two of the largest tuna stocks; skipjack and yellowfin, have been maintained in a very healthy state. The main target species in the fishery, skipjack (accounting for some 70% of the total catch) is currently underexploited, while yellowfin (accounting for some 25% of the total catch) is close to fully exploited (WCPFC, 2013). Only the third stock, that of bigeye tuna (accounting for some 5% of the total tuna catch), which constitutes hard-to-avoid bycatch in the purse seine fishery, is overexploited in the sense of being below the MSY level (WCPFC, 2013).

PNA VDS: Key economic data

- Purse seine share of catch value in PNA waters 78%, 17% other nations waters, 5% high seas
- Benchmark minimum price for foreign vessels US \$8,000 per VD
- 2015 license fees US \$340 million
- 10,000 employed in processing (over 90% PNG and Sol Is); over 4,000 as crew and observers (1,700 PNG)

The economic success of the VDS has been more impressive. Since the introduction of the VDS, the fishing fee revenues collected by the VDS-partners have increased dramatically (FFA 2015). At the present they amount to a significant part of the landed value of the catch and are still increasing. It moreover appears that a good part of these gains represents an overall improvement in the net economic benefits generated by the fishery; there are no signs that the profitability of the fishing fleets has been reduced by anything like the increase in the fishing fees.

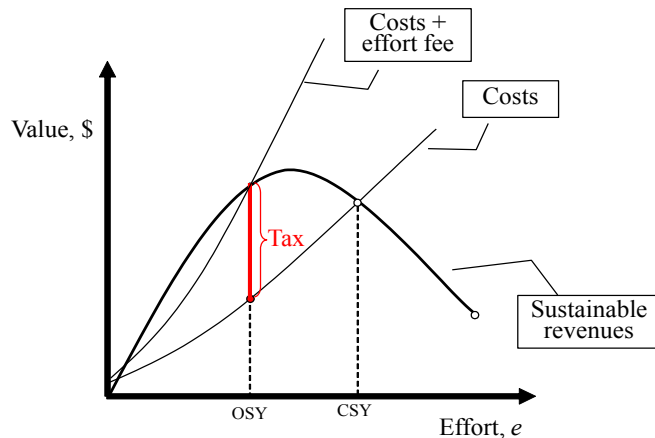
Reasons for the success of the VDS

The comparative success of the VDS system raises the question of what elements of the VDS are primarily to thank. To help answer this question we created a bioeconomic model of the PNA purse seine fishery (PNA Office 2014). Success is measured in terms of rents generated.

¹ The Parties to the Nauru Agreement (PNA) are the Federated States of Micronesia, Kiribati, Marshall Islands, Nauru, Palau, Papua New Guinea, Solomon Islands and Tuvalu. Tokelau also participates in the VDS

To maximize rents: Set an access fee

The VDS restricts the number of vessel days. However, effort restrictions, since they do not curtail the common property problem, will not lead to significant sustainable economic benefits from a fishery (Clark 1990, Arnason 2007). The reason is that fishing effort is a multidimensional variable and restricting just one component, e.g. fishing days, will only lead to an expansion in other components, e.g. vessel efficiency. On the other hand, it is also well known that taxes on common property fisheries can in principle generate sustainable economic benefits equal to the tax revenue (Clark 1990, Arnason 2007).



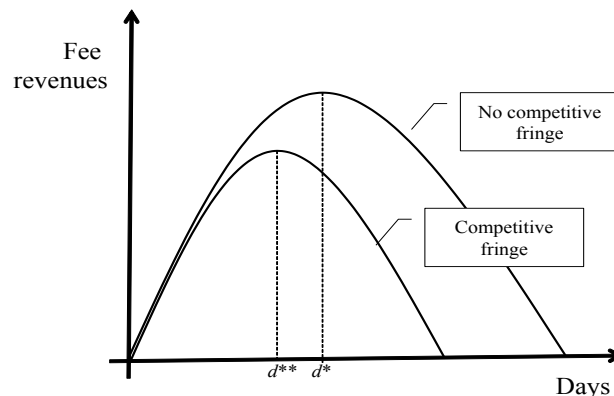
This is precisely what seems to be happening under the VDS. Limiting the supply of VDs and selling them at the market price amounts to a tax on the fishing activity. The tax revenues (after collection costs) are equivalent to net economic benefits from the fishery, for fishing companies that pay the tax will not be operated at a loss. The tax also reduces the profitability of fishing and thus the incentive for investing in effort components that can compensate for limited VDs.

Thus, the potent fisheries management component of the VDS system is not the limitation on VDs per se but the fishing fee per vessel day. The higher this fee, while the allowable fishing days are still being used, the more economically efficient will the tuna fishery be and the greater its net contribution to the world economy.

To maximize rents, minimize the competitive fringe

Maximizing fee revenues to the VDS-coalition may be hampered by alternative or substitute fishing opportunities open to fishing companies. These substitutes may be external to the VDS-region or they may exist within the EEZs of the VDS-partners. of competition is often referred to as the competitive fringe in competition theory (MacDonald 1986).

The VDS-coalition, in attempting to maximize its tuna fee revenues is hampered by the existence of the competitive fringe. This inevitably gives rise to a competitive game between the PNA and the competitive fringe. This game may evolve in various ways.



- Even when the competitive fringe pays passively its presence will reduce the maximum fee revenues attainable by the coalition;

- The reduction in attainable profits will be greater if the competitive fringe plays competitively (actively reacting to the moves of the coalition);
- If the coalition and competitive fringe do not coordinate their actions, both parties will have to accept lower unit fees and collect less fee revenues than if they act in a coordinated fashion; and
- The coalition and the competitive fringe can maximize their total fee revenues by acting co-operatively.

To minimize the competitive fringe and maximize rent generation (or minimize rent dissipation), the PNA collective should:

- Actively expand the VDS-coalition
 - At least get potential competitors to act co-operatively
 - Develop formal and legal procedures for the entry of new members into the VDS;
- Try to end “free” fishing from high seas; and
- Bring all tuna fishing within members’ EEZs under a uniform expanded VDS.

Maximizing rents means optimizing the distribution of fishing effort

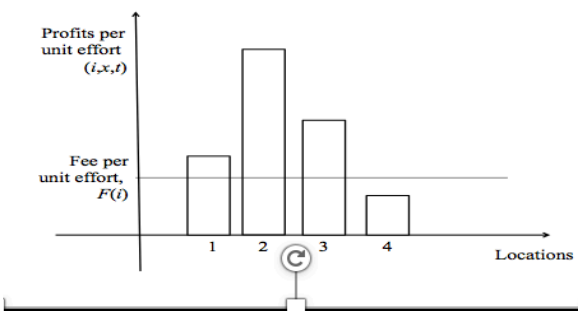
A VD in a given EEZ will generally not yield the same harvest as a VD in another EEZ. Trading of VDs between VDS-partners will make the various VD prices more equal. The more equal the VD prices the closer is the geographical pattern of fishing to the optimal one. Free trading of VDs between partners is conducive to more optimal geographical distribution of the fishing effort.

It is important to realize that trading of VDs will normally be from those EEZs that are less profitable for fishing to those that are more profitable. This, however, does not mean that those VDS-partners from which VDs are traded will be disadvantaged by this. On the contrary. Those VDS-partners who elect to sell some or all of their VDs will only do so if they receive a higher price that they can obtain from the fishing companies. Thus, they share in the higher profitability of the other EEZ to which they sell. In fact, both parties gain because the purchasing partner will only buy at a price that is lower than what he can obtain from the fishing companies in his EEZ. So, both trading partners gain and, therefore, so will the VDS coalition as a whole.

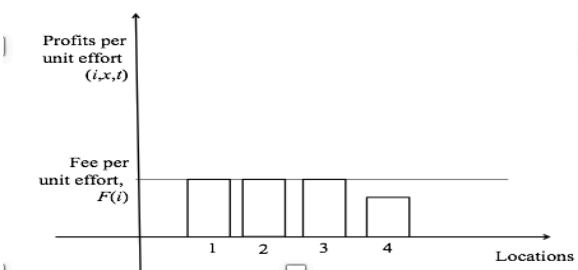
Rents in the PNA VDS will thus be maximized when fishing effort is spatially optimal. In practice this means:

- VDs are homogeneous and can be used in all of the VDS-partners' EEZs (pooling);

Profitability of different fishing locations under an equal fee regime



Realized profits in equilibrium under an equal fee regime



- There is free trading of VDs between partners; and
- Fishing companies are allowed to switch their VDs between EEZs of PNA members.

Summary

The creation of the VDS by the PNA provides a real world case for exploring the benefits of cooperation in the management of high migratory and trans-boundary fisheries. Our work suggests the following general lessons for the management of highly migratory straddling stocks:

- The greater the proportion of stock controlled by a coalition, the higher the rents generated;
- The greater the external competitive and or internal fringe, the lower the rents generated and available to all – collective or fringe;
- The greater the transferability of days/fishing rights across coalition EEZs, the higher the rents created; and
- It is the access fee that drives both biological conservation and rent generation in a fishery.

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