

Observations of the Effects of Catch and Release Fishing in Amazonia

By Paul Reiss

The concept of catching a desirable sport fish and then releasing it, unharmed, has a long history. Trout anglers in England have utilized the practice for several centuries in an effort to maintain fish populations in their prized, local streams. Fishing legends and authors, Zane Grey and Lee Wulff, popularized the concept in the United States in the middle part of the 20th century¹. Conservation and fishery departments throughout the United States and around the world embraced and applied the concept as a conservation and fishery management tool².

In recent years, these concepts have dovetailed with the desire to implement “sustainable harvest” systems in tropical rainforest habitats³. Catch and release fishing in this new application helps to ensure environmental preservation while promoting the economic independence of indigenous peoples. This essay will describe observations of several recently evolved sport fisheries in the Amazon basin for the purpose of providing background descriptions of their effectiveness and benefits in the applied areas.

The observations recounted here indicate that the availability of a robust catch and release fishery is an attraction to sport fishing tourism and can provide environmental protection to a region while simultaneously enabling an economically beneficial sustainable harvest for its inhabitants.

Introduction

The core concept of catch and release fishing is that, by releasing fish caught via controlled sport fishing means, these fish will continue to be available for natural purposes: breeding, predation, and provision of food to other species, as well as available for others to catch again. Recognizing that a gamefish is too valuable a resource to be caught once and squandered, catch and release fishing enables potential human consumers involved in fish catching for sporting purposes to perform the activity without actually consuming the resource. Catch and release fishing thereby adds a new level of economic benefit to the existing natural benefits of the resource. This is a prototypical example of sustainable harvest and is a compelling argument favoring a non-consumptive approach to a fishery¹.

The long term use of catch and release fishing in carefully observed fisheries has provided detailed knowledge and feedback regarding its efficacy as a tool for the minimization of environmental impact. It has also provided insights into how its use can be optimized to suit a particular species or region, as well as techniques by which this can be realized.

Applications - As a developed and populous country, the United States provides an excellent example of the historic utilization of catch and release fishing. Almost all of the United States' coastal and freshwater fisheries are routinely accessed by sport fishermen. Sport fishing is an enormous economic factor in the United States, bringing significant revenues to regions with attractive fisheries. The most remote regions often generate the greatest interest among anglers and consequently receive the greatest proportionate local economic benefits. It is estimated that over 44 million Americans fish for sport, probably catching and releasing hundreds of millions of fish yearly. Anglers directly spend upwards of \$41 billion dollars yearly to pursue their sport and generate \$116 billion dollars in economic activity⁴. In order to maintain these economically important fisheries while continuing to protect the attractive natural environments that make them possible, Americans have evolved highly effective conservation mechanisms.

Typically, U.S. regional fisheries permit a controlled and selective harvest of targeted species caught. Seasonal regulations, size limits, bag limits and slot limits, together with catch and release techniques are used to minimize environmental impact and to maintain a healthy fishery with adequate brood stock to ensure constant populations. The U.S. federal government and all state governments maintain conservation entities for the purpose of developing, studying, implementing and enforcing the conservation mechanisms in effect. These government agencies are supported primarily by license fees paid by fishermen and contributions provided by interested non-governmental organizations⁴.

As techniques have improved and popular support for catch and release fishing has grown, fishery health, fish stocks and even fish size have improved throughout the U.S., particularly over the past 25 years. The United States today enjoys healthier fisheries, waterways and a better protected environment than it has at any time in the past century. It has become common, accepted fact in the United States that controlled sportfishing using catch and release techniques is the single best means to ensure fish and fishery protection. Avid sport fishermen contribute both the funds and the public support necessary for these sweeping environmental improvements. Lawmakers in the United States, using currently available supportive information have created guidelines for regional regulations that support "freedom to fish" under catch and release policies. Federal Acts promulgate the view that "sensible fishing policies must be based on sound science and that scientifically-based standards must be met before any waters are closed to recreational fishing". The long-term use of catch and release fishing in the U.S. has clearly demonstrated that conservation-minded sport fisherman are a powerful conservation tool⁵.

Catch and release has become an effective conservation technique for aquatic environments throughout the world. Great Britain, Australia, Canada, Norway and Japan have been long term practitioners. Other countries including the European Union (France, Germany, and Italy etc.), Korea, the Bahamas and the Seychelles have adopted the concept more recently. Catch and release is in regional use in many other countries, including Venezuela, Argentina, Brazil, Mexico and Costa Rica. Conservation minded entities worldwide have learned that wherever people are present, and whenever it is

determined that the value of a fishery or region is great enough to have an economic or lifestyle input on the citizenry, the introduction of catch and release sportfishing to such regions provides the means for protection against unregulated poaching, over-harvesting by commercial fishing or simple environmental degradation through lack of monitoring or regulation.

Catch and release mortality and efficacy studies have been performed in a wide range of environments, on many species and from varying perspectives. An analytical examination of these results provides clear and valuable information as to how to optimize catch and release procedures for specific applications. A properly applied catch and release program can provide minimal environmental impact and assure very low mortality of released fish. See the attached review of “Catch and Release Fishing Effectiveness and Mortality”.

Observations of Catch and Release Effectiveness

Brazil's Amazon region has a rich and varied fish population that is important to the region's food markets, the international aquarium trade and as an attraction for the promotion and development of tourist sportfishing. These interests are intermingled and can have significant impact on each other if not carefully managed. Amazonia has had difficulties in the past, both political and environmental, due to deficiencies in cohesive planning, regulation and fluctuating conflicts of interest regarding the utilization of its aquatic resources. Recently, regulatory and economic changes have helped to diminish the problems in some areas and promote significant improvements in the utilization of these resources.

For several decades, the successful implementation of the concept of “Sustainable Harvest” has had a profound beneficial impact on the people and the environmental health of tropical rainforest regions throughout the world. The core of this concept is utilization of an environment or ecosystem in a manner for which it is well suited, thereby retaining the ecosystem's integrity. The regional population must be integral to and involved in all aspects of the process and its associated problem solving. The resulting economic system benefits promote an increase in self-reliance for the population while simultaneously gaining their support for the preservation of the environmentally precious lands. Catch and release sportfishing is observed to be a mechanism for the implementation of the sustainable harvest concept, probably applicable throughout the Amazon's sport fish holding riverine areas. Some case observations in selected areas are:

Brazil - Igapo Acu Region, Peacock Bass fishery - Catch and release fishing has been successfully implemented in Amazonas' State's Igapo Acu region. This conglomeration of a large, clear black water river, a smaller, stained water, lagoon studded, river and a large flooded forest constitutes a typical peacock bass fishery to the south and east of the town of Borba on the Rio Madeira. It had been a popular, although not a superior, sportfishing destination since the early 1990's. Until 1998, the typical catch per angler,

per day, averaged less than 20 fish, with the size of the largest specimens limited to approximately 18 pounds. During this time, both commercial fishermen using nets and fish-harvesting fishermen from Manaus using fishing tackle routinely poached in the area. In 1998, the indigenous residents of the area gained the opportunity to offer exclusive catch and release only fishing rights to sport fishermen in return for a reasonable license fee.

The fishery was closed to all fishing except catch and release sportfishing. The fees permitted policing of the area, strongly aided by the presence of the sportfishing anglers who reported the presence of any other boats. This rapidly eliminated the uncontrolled fish killing by commercial netters and fish-harvesting outsiders. Within a season the fishery began to improve. Without any observable changes in natural factors, present average daily catches have increased to over 30 fish per day and large specimens of up to 22 pounds have begun to appear.

Table 1 – Fishing Results in the Igapo Acu Region ^{a,b,c,d}

Year	# of fish caught/year	# of guided boats	# of fish over 12 pounds	Largest fish of year
2002	26,880	74	3,798	22 lbs.
2001	19,938	72	2,045	21 lbs.
2000	17,104	66	1,619	20 lbs.
1999	13,629	62	1,242	20 lbs.
1998	14,910	70	1,397	21 lbs.
1997	15,480	72	1,622	18 lbs.
1996	16,835	70	1,408	17 lbs.
1995	15,360	64	1,344	19 lbs.

- a - Data furnished by NG Turismo, Ltda., operators of the sport fishery.
- b - Anglers spent an average of \$3800 for their trips.
- c - Two anglers fished in each boat.
- d - Anglers fished for six days.

It can be observed from the data that the implementation of catch and release fishing proved beneficial to the targeted peacock bass population. Additionally, this area was almost devoid of many other native species before 1998. In the years since the implementation of catch and release fishing, observable improvements have occurred in the populations of other non-targeted resident and migratory species (such as *Pirarucu/Arapima*, *Matrinchao/Brycons*, *Jacunda/Crenicichla* spp., *pacu/Colossoma*, and various catfish). The return of spawning fishes to their waters, protection from nets and the prevention of harvesting fish from this fishery benefited many species.

It can also be projected that the entire region’s aquatic environment in general benefited as well. The peacock bass is not a migratory species and therefore does not impact the environment and economics of regions outside of the specified fishery. Migratory species, however, are often harvested in areas outside of their high water habitat.

Protecting the Igapo Acu region improved its performance as a not only as a hatchery for spawning fish but also as a nursery for immature fish, thus benefiting the region beyond the fishery as well. Providing an environmentally secure headwaters region may help to buffer the detrimental harvesting and depletion that occur when species are migrating and at their most vulnerable⁶.

The area's people benefited as well. The village of Piranha, with 85 inhabitants, on the southern bank of the Rio Preto, near the mouth of the Matupiri, generates between \$1500 and \$3000 per year from crops, primarily manioc, sold in Borba, a large town on the Rio Madeira. As a result of revenues gained from the sport fishery, the village has more than doubled this income. The direct economic benefits are a meaningful improvement to the villager's ability to support themselves. They previously received no benefit whatsoever from poaching and fish-harvesting anglers, who in effect stole their natural resources. The improvement of the fishery also improved their ability to harvest for their family's table consumption. They quickly recognized the value of protecting the fishery and thereby further improved the policing available by adding their own community observations to the official and sportfishing cadres.

Brazil - Xeriuni Region - Another example of a successful implementation of catch and release fishing occurs in Roraima State's Rio Xeriuni, a tributary of the lower Rio Branco. Long passed over by sport fishermen because of its mediocre sportfishing qualities, conditions rapidly began to change in the late 1990's when the river became a catch and release only fishery. With the advent of a locally exclusive tourist sportfishing operation, revenue began to enter the area and accrue directly to the local villagers. The indigenous residents of the area, in cooperation with the sportfishing operation successfully policed the river, preventing poaching and misuse of the aquatic resources. Anglers observed careful catch and release techniques. The river's peacock bass population rapidly increased, along with the overall aquatic health of the river. The river improved as a sport fishery, going from a destination largely ignored by touristic anglers to a fishery boasting an impressive percentage (39% of all peacock bass caught in 2002 were over 10 pounds) of large fish. The area was restored to a robust natural equilibrium and gained substantial economic benefit from the changes, undoubtedly benefiting the region at large as well.

Venezuela - Peacock Bass Fisheries - An example of the negative effect of failing to protect a fishery can be seen in Venezuela's Amazon region, upper Orinoco watershed. In the late 1980's and early 1990's the region boasted a relatively pristine peacock bass and payara fishery due to the difficulty of access by commercial fishermen and the inability of locals to effectively exploit the fish population. Protecting the region's aquatic resources was never addressed by local government and the area's residents were never motivated to do so by any form of direct economic gain other than the value of fish they could catch. Sportfishing occurred in a nonexclusive, non-regulated manner. No catch and release concepts were introduced or enforced and all parties were free to access and utilize the region's aquatic resources as they saw fit.

With the advent of better boats, equipment and modern fishing tackle in the hands of the local residents and new access roads allowing outsiders entry by automobile, the area's natural protections fell away and the fishery was rapidly depleted. Today, it is uncommon in most of these fisheries to encounter a peacock bass larger than 10 pounds. The area has become unattractive to touristic anglers and the local population has received absolutely no measurable economic benefits. Contrary to the concepts of "sustainable harvest", the region's resources have been depleted, by both locals and outsiders, with no system in place to enable long-term beneficial use.

This region could probably still benefit from the implementation of a catch and release sport fishery if it would be practical to institute one. A period of several years of protection would likely be necessary before the fishery could recover sufficiently so that this region could once again attract significant tourism. The associated revenues would be very difficult to achieve without motivated local cooperation and a commitment to protection. Unfortunately, local culture has evolved to a perception that the aquatic resources, however diminished are everyone's to exploit as they see fit. The concept of protection of the resource by local restraint is not likely to be readily accepted in this environment. The progression of events in this region suggests that a fishery may most easily be protected before it actually needs it. Protection appears to be more difficult to implement after the resource has been diminished.

Venezuela –Uraima Falls Payara Fishery - Venezuela's Rio Paragua presents an example of a very successful implementation of the combination of catch and release fishing and local economic benefit. The Paragua's aquatic resources are exploited by both indigent local residents and migratory "garimperos" or gold/diamond miners. In the late 1980's a farming family living near the mouth of the river, purchased an island located between two braids of the river. The island was located at the base of a large, relatively impassable waterfall which proved to be a natural concentrator of large *pirandira*/payara. The family, with the advice of a well-traveled friend, quickly recognized the potential benefit of creating a sportfishing operation at the location. When the family applied for permission to create and maintain a sportfishing camp in the area, local government astutely recognized the potential benefit to its citizens as well as to the river itself. An exclusive permit was granted to the family in recognition of the investment necessary to implement their plans.

Within a year, the operation was successfully attracting tourists and distributing a portion of the revenues to the local residents in the form of salaries for guides and camp staff as well as by purchasing supplies and materials locally. The impact on the local economy was meaningful and local residents quickly recognized that maintaining a successful sportfishing operation was valuable to them. Together with camp owners, they began to jointly police the area, preventing gross fish harvesting and protecting the resource from which they both benefited. The camp owners instituted a strict catch and release policy to protect their key resource, the sportfish.

Over a decade, the local population and the incidence of "garimperos" entering the area increased significantly. The locals, motivated by the economic benefits they received,

communicated directly with the “garimperos”, to prevent possible depredations on the fishery. In the face of changing demographics, increasing population and conditions that might have otherwise depleted the resource, the Uraima Falls fishery maintained its natural aquatic health and simultaneously benefited the local population. The benefits of increased payara population were observed even in Lake Guri, hundreds of kilometers away, as a result of payara migrating downriver into its waters.

Table 2 - Uraima Falls – Payara Catch History ^{a,b}

Year	# of payara caught	Average size	# of Fish over 25lbs.	Largest fish caught per season
2000	2075	13.95	110	33 lbs.
1999	1983	13.65	85	29 lbs.
1998	1932	13.50	73	32 lbs.
1997	2010	10.90	67	42 *Non IGFA*
1996	1953	11.47	59	39 *IGFA* Record
1995	1645	11.70	61	29 lbs.
1994	1050	10.75	54	31 lbs.

- a - Data furnished by Humberto Malaspina of Uraima Falls Payara Lodge
- b - Due to political instability, tourism was drastically reduced in 2001 and 2002. Minimal fishing occurred, therefore statistics are not available.

An examination of the payara catch history at Uraima Falls, as displayed in the above table, indicates that the quality of the fishery has not only been maintained, but appears to show improved numbers in every category. The history of the fishery at Uraima Falls demonstrates the advantages of preemptively instituting a catch and release policy. Sportfishing benefited local residents and created a culture of conservation consistent with the concept of “sustainable harvest” thereby protecting the environment and the natural resource well before its depletion was threatened by changing demographics.

Discussion

Michael Goulding, a recognized expert on the fisheries of the Amazon, has commented that, “The sport fishing potential of the Amazon is quite high from an environmental point of view”. According to Goulding, although the environmental and economic benefits of sportfishing in the Amazon have become more visible and have increased sharply in value during the last two decades, it is perceived that the necessary infrastructure and organization necessary to properly develop and regulate this resource are lacking in Amazonian regions. Goulding has summarized that the prospects for enhancing economic viability and long-term sustainability of the fish resources of the Amazon have been complicated by over-exploitation by commercial fishing and under-exploitation of minimally impacting sport fishing opportunities ³.

Conclusion

Scientific evidence demonstrates the high degree of effectiveness of a carefully designed catch and release program as a tool for environmental protection. Observation of the results of the application of catch and release fishing in specific Amazon areas indicates that it is also an effective mechanism for implementing sustainable harvest programs in the Amazon basin. The attendant low fish mortality rates ensure minimal environmental impact. The increase in local awareness and the improved policing of the area afford a mechanism to reduce or eliminate pre-existing negatively impacting activities, such as uncontrolled netting or poaching. Significant economic benefits accrue to the region as a result of local spending by touristic sport fishermen and the sport fishing operators.

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