Fisheries Potential of the Gulf of Uraba

C. RICHARD ROBINS
Rosenstiel School of Marine and Atmospheric Science
University of Miami
Miami, Florida 33149

The Gulf of Uraba lies near the western end of the Caribbean coast of Colombia, not far from the Panamanian border. Its mouth is about at 8°35'N latitude and its southern blind end is about at 7°55'N latitude. On its southwestern side it receives the effluent of the Rio Atrato through a series of channels, and these have formed a delta with several fingers projecting into the Gulf. The town of Turbo is on the eastern side and there are several industrial dock sites farther south. Large freighters sail into these docks for timber, bananas, and cocoa.

The Gulf is surrounded by hills and mountains, most of which have been cut over in the vicinity of the Gulf and placed in banana production. The area is noted for its violent weather during the summer months and heavy rainfalls cause freshets in the Valley of the Rio Atrato. These freshets carry silt, and rafts of streamside vegetation (including banana trees), and much other debris to the Gulf. Although these outpourings have helped create the Atrato Delta and have deposited dead trees, and other debris in the southern end of the Gulf (south of the Delta), most of the silt and flotsam drift out of the Gulf in a narrow lens of dirty fresh water. Zeigler and Athearn, 1965 (Fig. 2) showed only minor changes in contours between 1938 and their survey in 1960. These changes, indicative of silting, were noted only in the immediate vicinity of the Atrato Delta. Once north of the Gulf they come under the influence of the Coriolis' force and move to the right and northeast across the shelf. At the edge of the shelf this drift comes under the influence of a westward drift and bends sharply to the west. During its transit of the shelf and especially under the influence of the heavier seas in the westward drift, the effluent is mixed and settles to the bottom. The result is a bank of muddy river bottom sediment encompassing some 200 km^2 (from the inside of the mouth of Uraba to the northeast) and the presence on the slope of sulfur-rich black deposits with tree fragments and other debris to a depth of 1500 m. As noted by Zeigler and Athearn (1965), the Gulf loses its identity at the shelf at about the 70-m contour at latitude 8°45-50'N.

The Gulf itself has an amazingly clean, flat bottom varying from about 60 m near its mouth to 40 m through most of its length, except south of the delta of the Rio Atrato. Even there depths greater than 20 m are found. The edge of the Gulf is steep, especially along its western edge and near Punta Arenas, with little slumping of materials. The waters are well protected and navigation is easy except during the local heavy storms. For a series of detailed hydrographic charts of the Gulf and of the Rio Atrato basin, see Selfridge (1874).

In 1966 the research vessel **R/V JOHN ELLIOTT PILLSBURY** surveyed coastal waters of the southern Caribbean from the Costa Rican-Panamanian border to Cartagena. The Gulf of Uraba was visited twice on this cruise. We worked offshore of Uraba until heavy storms abated and sailed in at dawn to

find islands of vegetation floating seaward along with thousands of dead estuarine fish from the Rio Atrato. The trace recorded by the Precision Depth Recorder was very smooth. When the ship was brought about to set the net, the screws brought clear ocean water to the surface indicating that the lens of dirty fresh water was only about a meter thick. We had no difficulty with any of our net tows in the Gulf.

The fish fauna on the bottom of the Gulf is typical of what one associates with clean coastal banks. Of principal importance, both in terms of numbers of fish and weight or volume, were the jack (jurel) *Chloroscombrus chrysurus* and the snapper (pargo) *Rhombloplites aurorubens* (known in the United States are vermillion snapper) and *Lutjanus synagris* (lane snapper). Both snappers are common market fishes in Florida. Penaeid shrimp were also collected in small numbers and the population is no doubt limited by the nature of the shore of the Gulf. At station 358 more than 2000 *Chloroscombrus* were collected in a 1-h tow with a 12.5-m semiballoon trawl.

Other usable species caught in smaller numbers included other Carangidae *(Caranx crysus* and *C. hippus, Vomer setapinnis* and a variety of Mugilidae (liza), Gerreidae (mojarra), Clupeidae (sardinas), Ariidae (bagre), Engraulidae (anchovetas), and Bothidae (flounders).

Near the delta of the Rio Atrato, sea catfishes (bagre) and especially Mugilidae (liza) were common. In addition to these species there are numerous other species of potential value that are generally regarded as trash fish in developed countries. Such fishes as goatfishes *(Upeneus parvus),* cusk-eels (marketed as perla), muraenesocid eels (marketed as zafiro), gobies *(Bollmannia)* are generally regarded as too small, too uncertain in the catch, or too unappealing, despite the quality of their flesh, to deserve attention. Yet such marginal species, when added to a more substantial fisheries, can add to the profit margin if marketed properly. The Gulf of Uraba and its environs is rich in such ancillary species.

As students of fishes know (Robins, 1971), the marine continental fish fauna of tropical South America is characterized by Sciaenidae (corvinas, etc.), Clupeidae (sardinas), Engraulidae (anchovetas). These types abound in and near the mouths of all large rivers where mud bottom dominates. This fauna is of little consequence within the Gulf of Uraba but it is to be found on the muddy area that I mentioned earlier as occurring to the northeast of Uraba on the shelf and extending into the northernmost part of the Gulf itself. The numbers and kinds of fishes caught here are 3 to 4 times greater than within the Gulf or farther away from the Gulf off the open coast.

More than six species of Sciaenidae, threadfins (Polynemidae), mojarras (Gerreidae), grunts (Pomadasyidae), anchovies of several species including *Cetengraulis edentulus,* thread herrings *(Opisthonema)* and other tropical herrings *(Pellona, Odontognathus, Chirocentrodon),* and sea catfishes (Ariidae) can be found here. In effect, the mud shadow emanating from Uraba is home to an island of the southern Continental fauna. All of the species mentioned are commercial species utilized in other parts of their ranges. At the time of our visit there was virtually no fishing activity in Uraba. A few fishermen using handlines fished from dugout canoes (cayucas) in the vicinity of Turbo. Limited fishing was done by the crews of visiting ships including our own.

How is an area like the Gulf of Uraba to be utilized from a fisheries standpoint? Fisheries are always seeking new levels of efficiency. But efficient modern fisheries are not for Uraba. The area is too small, the population too limited, to support the activities of one large modern fishing vessel. However, the region could support 3 or 4 small boats (of the type used in the Biscayne Bay bait shrimp fishery) equipped with paired 3- to 6-m try nets or roller trawls. Good sea conditions and the smooth clean bottom should minimize gear loss. The fish caught would be for domestic consumption.

Present port facilities are more than adequate for such vessels. Planned development of the Atrato Valley by Colombia should result in an increase and modernization of existing facilities and promote a broader market for seafood.

Icing facilities, better transport to nearby markets, and expansion of the market itself are, as always, major stumbling blocks to the development of such a small-scale or artesan fishery. One way to broaden the base of support would be to study the potential of inexpensive oyster culture at the head of the Gulf, in the neck termed Bahia Colombia. Such culture is widely practiced in Guyana and in many of the lesser developed countries and does not involve advanced or expensive technology.

Small-scale fisheries must be valued not in terms of contribution to export dollars, but in more basic values such as providing meaningful employment to a few more people and in providing inexpensive quality food for local consumption. Should such a fishery be initiated at Uraba, it must be protected from fishing by the occasional larger fishing vessel that might tow its nets for one or two nights and leave. This is, in 1977, the current practice of trawlers working the Colombian coast.

The nature of any development of the Atrato Valley, if it involves development of a navigable waterway into the interior, could profoundly alter the ecology of the Gulf itself. With proper planning such development could proceed with minimal or even beneficial impact. On the other hand, straightening the Atrato Channel could increase silt load (by increasing erosion) and rapidly extend the delta itself. Plans for development of the Atrato go back, at least, to the survey by Selfridge (1874).

Quite apart from its own potential the development of a small-scale fisheries in the Gulf of Uraba could provide a valuable model for the planning of such fisheries in general. The area is rather isolated, self-contained, with very little pollution but with the likelihood of the increase of effects of man's activities in the near future.

It is this model that renders the development of a small-scale fisheries at Uraba immediately desirable.

Potencial Pesquero del Golfo de Uraba

RESUMEN

El Golfo de Uraba se encuentra en la frontera panameña de la costa del Caribe de Colombia. El Río Atrato desemboca cerca de su extremo sur. Aunque sedimentos y desechos (sobre todo plantas incluyendo ramas de gran tamaño) son arrastrados durante las crecidas del Río Atrato, ellos flotan formando en el Golfo una película superficial de

aluvión fluviátil que se deposita en la plataforma continental del noroeste de Uraba y a lo largo del declive continental, mar adentro. La mayor parte del Golfo es limpio y plano, siendo de alrededor de 30 m. la profundidad promedio de su fondo arenoso.

Los biólogos de la Universidad de Miami, a bordo de la N/I JOHN ELLIOTT PILLSBURY, estudiaron el Golfo en 1966 como parte de un amplio estudio de la fauna de las aguas desde la plataforma de Cartagena, Colombia, hasta el borde de Panamá – Costa Rica. Se descubrieron en el Golfo grandes poblaciones de pargos, como la biajaiba (*Lutjanus synagris)* y el cotorro (*Rhomboplites aurorubens*), y de casabe (*Chloroscomber chrysurus*). El área de fondo fangoso que el Río Atrato suministra es de unos 200 Km.^{2} en la plataforma fuera del Golfo y sostiene prudenciales poblaciones de corvinas (Sciaenidae), sardinas (Clupeidae), y anchoas (Engraulidae), especialmente *Cetengraulis edentulus* y machuelos (*Opisthonema* spp.).

La información existente sugiere que la pesquería artesanal, utilizando 3 ó 4 botes pequeños (del tipo usado en la Bahía de Biscayne por los pescadores de camarones que se usan como carnada) equipados con parejas de redes de puertas de 3 m. o arrastres de rodillos, pudiera efectuarse para estas especies. Las buenas condiciones del mar y lo parejo y limpio de su fondo garantizan un mayor aprovechamiento de las artes de pesca. El camarón así como otras especies importantes son tomados en el área y pueden ser utilizados aunque sus poblaciones no justifiquen una pesquería en su propio derecho. La pesca actual sólo hace uso de canoas piraguas (cayucas) y de palangres (hand-lines).

El Golfo de Uraba es demasiado pequeño y sus poblaciones de peces son demasiado limitadas para sostener embarcaciones pesqueras mayores con arrastres convencionales de 12 m. o arrastre (semi-balloon trawls) y aún breves incursiones de dichas embarcaciones pudieran dañar seriamente la propuesta pesca artesanal.

Se dispone de facilidades portuarias en el Golfo las que funcionan como centro de transporte de madera y plátanos. El Plan de Desarrollo del Valle Atrato de Colombia debiera conseguir un aumento y modernización de las facilidades existentes y proveer un mercado de mariscos más amplio.

LITERATURE CITED

Robins, C. R.
1971. Distributional patterns of fishes from coastal and shelf waters of the tropical western Atlantic. *In*: Symposium on Investigations and Resources of the Caribbean Sea and adjacent regions. Papers on Fisheries Resources, FAO, Rome: 249-255.

Selfridge, T. O.
1874. Report of explorations and surveys to ascertain the practicality of a ship canal between the Atlantic and Pacific oceans by the way of the Isthmus of Darien. Dept. of the Navy, Washington Gov't. Printing Office, pp. 1-268, 17 foldout maps.

Zeigler, J. M. and W. D. Athearn
1965. The hydrography and sediments of the Gulf of Darien. Woods Hole Oceanographic Institution, Woods Hole, Mass. 65-29: i-ii, 1-6, 10 figs.