

= Pará @-@ class monitor =

The Pará class monitors were a group of six wooden @-@ hulled ironclads named after Brazilian states and built in Brazil for the Brazilian Navy during the Paraguayan War in the late 1860s . The first three ships finished , Pará , Alagoas and Rio Grande , participated in the Passagem de Humaitá in February 1868 . Afterwards the remaining ships joined the first three and they all provided fire support for the army for the rest of the war . The ships were split between the newly formed Upper Uruguay (Portuguese : Alto Uruguai) and Mato Grosso Flotillas after the war . Alagoas was transferred to Rio de Janeiro in the 1890s and participated in the Fleet Revolt of 1893 ? 94 .

= = Design and description = =

The Pará @-@ class river monitors were designed to meet the need of the Brazilian Navy for small , shallow @-@ draft armored ships capable of withstanding heavy fire during the Paraguayan War , which saw Argentina and Brazil allied against Paraguay . The two foreign @-@ built river monitors already in service drew enough water that they could not operate on the shallower rivers in Paraguay . The monitor configuration was chosen as a turreted design did not have the same problems engaging enemy ships and fortifications as did the casemate ironclads already in Brazilian service . The oblong gun turret sat on a circular platform that had a central pivot . It was rotated by four men via a system of gears ; 2 @-@ 25 minutes were required for a full 360 ° rotation . A bronze ram was fitted to these ships as well . The hull was sheathed with Muntz metal to reduce biofouling .

The ships measured 39 meters (127 ft 11 in) long overall , with a beam of 8 @-@ 54 meters (28 ft 0 in) . They had a draft between of 1 @-@ 51 ? 1 @-@ 54 meters (4 ft 11 in ? 5 ft 1 in) and displaced 500 metric tons (490 long tons) . With only 0 @-@ 3 meters (1 ft 0 in) of freeboard they had to be towed between Rio de Janeiro and their area of operations . Their crew numbered 43 officers and men .

= = = Propulsion = = =

The Pará @-@ class ships had two direct @-@ acting steam engines , each driving a single 1 @-@ 3 @-@ meter (4 ft 3 in) propeller . Their engines were powered by two tubular boilers at a working pressure of 59 psi (407 kPa ; 4 kgf / cm²) . The engines produced a total of 180 indicated horsepower (130 kW) which gave the monitors a maximum speed of 8 knots (15 km / h ; 9 @-@ 2 mph) in calm waters . The ships carried enough coal for one day 's steaming .

= = = Armament = = =

The first three ships carried a single 70 @-@ pounder Whitworth rifled muzzle loader (RML) in their gun turret , but the last three ships substituted a 120 @-@ pounder Whitworth RML . The 70 @-@ pdr gun had a maximum elevation of 15 ° , but the larger gun 's elevation was reduced because of its longer barrel . Both guns had a similar maximum range of 5 @-@ 540 meters (6 @-@ 060 yd) . The 70 @-@ pdr gun weighed 8 @-@ 582 pounds (3 @-@ 892 @-@ 7 kg) and fired a 5 @-@ 5 @-@ inch (140 mm) shell that weighed 81 pounds (36 @-@ 7 kg) . The 7 @-@ inch (178 mm) shell of the 120 @-@ pdr gun weighed 151 pounds (68 @-@ 5 kg) while the gun itself weighed 16 @-@ 660 pounds (7 @-@ 556 @-@ 8 kg) . Most unusually the guns ' Brazilian @-@ designed iron carriage was designed to pivot vertically at the muzzle ; this was done to minimize the size of the gunport through which splinters and shells could enter .

= = = Armor = = =

The hull of the Pará @-@ class ships was made from three layers of wood that alternated in orientation . It was 457 millimeters (18 @-@ 0 in) thick and was capped with a 102 @-@ millimeter

(4 in) layer of peroba hardwood . The ships had a complete wrought iron waterline belt , 0 @ . @ 91 meters (3 @ . @ 0 ft) high . It had a maximum thickness of 102 millimeters amidships , decreasing to 76 millimeters (3 in) and 51 millimeters (2 in) at the ship 's ends . The curved deck was armored with 12 @ . @ 7 millimeters (0 @ . @ 5 in) of wrought iron .

The gun turret was shaped like a rectangle with rounded corners . It was built much like the hull , but the front of the turret was protected by 152 millimeters (6 in) of armor , the sides by 102 millimeters and the rear by 76 millimeters . Its roof and the exposed portions of the platform it rested upon were protected by 12 @ . @ 7 millimeters of armor . The armored pilothouse was positioned ahead of the turret .

= = Construction = =

= = Service = =

The first three ships finished , Pará , Alagoas and Rio Grande , participated in the Passagem de Humaitá on 19 February 1868 . For the engagement the three river monitors were lashed to the larger ironclads in case any engines were disabled by the Paraguayan guns . Barroso led with Rio Grande , followed by Bahia with Alagoas and Tamandaré with Pará . Both Alagoas , which had taken an estimated 200 hits , and Pará had to be beached after passing the fortress to prevent them from sinking . Alagoas was under repair at São José do Cerrito until mid @ - @ March , although Pará joined a squadron to capture the town of Laureles on 27 February . Rio Grande continued upstream with the other undamaged ships and they bombarded Asunción on 24 February with little effect . On 23 March Rio Grande and Barroso sank the Paraguayan steamer Iguerey and both ships were boarded by Paraguayan soldiers on the evening of 9 July , although they managed to repel the boarders .

For the rest of the war the river monitors bombarded Paraguayan positions and artillery batteries in support of the army , notably at Angostura , Timbó and along the Tebicuary and Manduvirá Rivers . After the war the ships were divided between the newly formed Upper Uruguay and Mato Grosso Flotillas . Alagoas was transferred to Rio de Janeiro in the 1890s and participated in the Fleet Revolt of 1893 ? 94 . The ships were disposed of during the last two decades of the 19th century , although Rio Grande was docked for reconstruction in 1899 . However , the work was never completed and she was eventually scrapped in 1907 .