# Development of a Fish Pump

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Pump fishing techniques can be applied to all shoaling fish or in a fish shoal which is created by some attraction method. The normal centrifugal pumps and reciprocating pumps have moving parts inside the pump and therefore the fish pumped get damaged. The author describes the development of a fish pump which works on the principle of pressure difference created by compressed air-water mixture. The accessories required for installation on boat are also described.

Pump fishing techniques can be applied to all shoaling fish or in a fish shoal which is created by some attraction method such as light attraction, electro-auodic attraction, pursed shoal in a purse seine etc. Fish caught in a purse seine or from other shoals should not get damaged while transferring to the boat. The normal pumps such as centrifugal pumps, reciprocating pumps etc. have moving parts inside the pumps and therefore the fish get cut or damaged by the moving parts of the pump. The fish have to pass through small crevices or valves of these pumps and therefore the size of the fish that can be pumped is limited by the size of the crevices or valves. Even the small fish also get damaged on pumping. Therefore it has been our endeavour to design a pump which will not damage fish when pumped and which should be capable of pumping fish of different sizes from a shoal. It has been reported by Burgess & Brady (1968) that a lift pump working on compressed air can be used for pumping fish. But no details of the different parts and the working principle were available. Therefore a project was taken up to develop a pump on this model.

**Materials and Methods**

Initially a laboratory model of the pump was fabricated and tested for trial purpose to see the effectiveness of the suctional force. This pump consists of a 50 mm diameter GI pipe of length about 1 metre. At midway of the pipe small holes were drilled round the pipe for a length of about 15 cm. This portion of the pipe was completely covered by another GI pipe of 100 mm diameter and sealed on both ends by welding with M.S. sheet and a small pipe is welded on top of one of the ends of the 100 mm pipe for connceting a flexible hose pipe of 10 mm dia. Thus the outside of the holed portion of the 50 mm GI pipe becomes a chamber with one outlet going through the small hose connecting the chamber and the other outlet going through the small holes of the GI pipe. The pipe is welded with clamping devices and hooks for attaching floats and sinkers.

One end of the GI pipe is connected to the suction funnel and the other end is connected with bends so that the delivery can either be made on to a separtor directly or it can be let to distant place as will be required in certain cases by suitable hoses.

Compressed air from a compresssor is stored in a receiver at 30 kg $cm^{-2}$. The receiver is connected to the fish pump through PVC pipes of 10 mm dia and a stop cock. Floats and sinkers are attached to the fish pump in such a way that the pump stands under water in an erect position and the delivery end of the pump is about 30 cm above water level. When the stop cock is open compressed air enters into the chamber of the pump which consequently enters the water column inside the pipe through the holes provided for the pipe. The water column above the chamber inside the pipe is mixed with air under pressure. Consequently the density of the air-water mixture becomes lower than the density of the water column in the lower portion of the pipe and hence the water is pushed up because of the pressure difference. A suction force is created at the lower mouth of the pipe and any solid particle such as fish, wooden pieces etc is also sucked along with water and is pushed out through the top end of the pipe. Thus as the operation is carried out the simple unit works as a pump.

Trials were conducted with the laboratory model of the fish pump in a fish tank with small fish such as tilapia, anabas etc. On working the pump it was found that the pump is capable of pumping fish which could easily pass through the 50 mm pipe.

After the trials with the laboratory model of the pump, a full scale pump was fabricated. This was done with 100 mm GI pipe of 3 m length as shown in Fig. 1. The chamber, suction end and delivery end were designed in such a way that almost all common shoaling small fish could be pumped, without much difficulty. A diesel engine was utilised as the prime mover for the compressor. A common base for the compressor, receiver and the engine was fabricated

and the installation of all the machines on the base was carried out. Pipe connections between the compressor and receiver were given and suitable V-pulleys for taking drive from the engine to the compressor were fixed and alignment checked. Hose connections were given from the compressor receiver to the chamber of the pump. The complete unit was taken in a vessel and the working of the pump was studied.

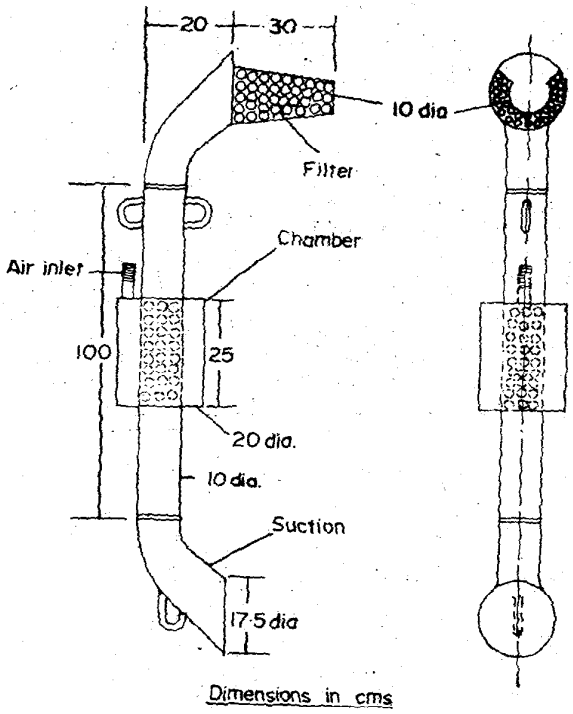


Fig. 1. Fish pump

## Results and Discussions

The pump was kept in water in a vertical position by making use of floats and sinkers which were attached to hooks provided on the pump. The level of water was kept well above the chamber. Compressed air was released by means of a stop cock. Water along with air bubbles started coming through the delivery end of the pipe. The pumping pressure varied with the level of the water above the chamber. It was seen that the pumping pressure is proportional to the height of the water level above the chamber. The pump was moved into a shallow region so that the suction end was just gracing the slushy bottom. Solid particles along with mud was pumped through the delivery end on releasing the compressed air.

The pump was taken and kept in a shoal of live fish such as anabas, tilapia etc. Compressed air was released and it was found that live fish were pumped without any damage to the fish.

This type of pump can be made use of for pumping small shoaling fishes such as sardines, anchovies, squids etc. The diameter of the pump should be selected in such a way that the fish which is intended to be pumped should pass through the pump. For bigger pump the quantity of compressed air required is more and therefore higher displacement compressor with appropriate sizes of receiver, stop cock and connections should be made use of. For research work the compressor unit has been made a portable one with separate diesel engine. But as a permanent fixture for each fishing boat the compressor, receiver etc. can be fixed in the boat and the drive for the compressor can be taken from the main engine of the vessel with appropriate pulley and belt system. The water fish mixture that is pumped can be filtered by a screen fitted to the delivery mouth of the pump as shown in figure and the fish can be collected easily in the vessel.

## Reference

Burgess, J. & Brady, P. (1968) *Fishing News Intl.* 7, 63