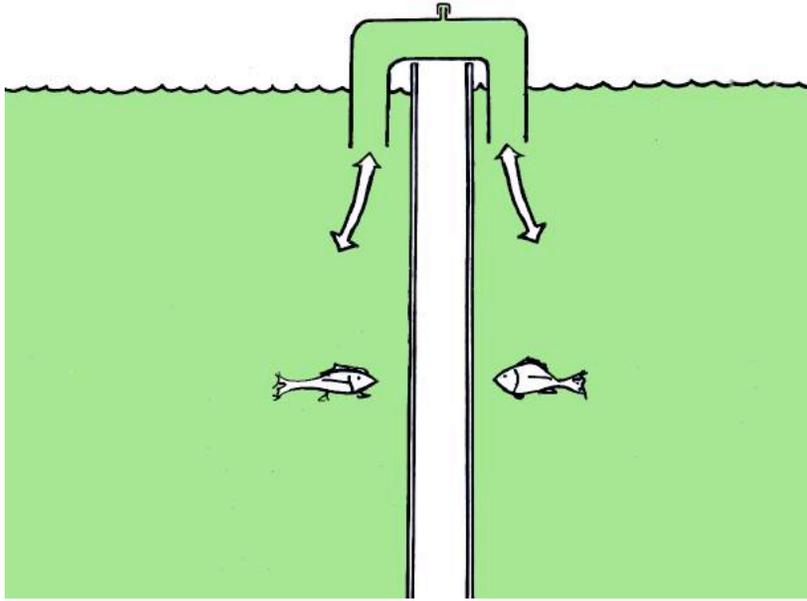


# Siphons

## The Missing Manual



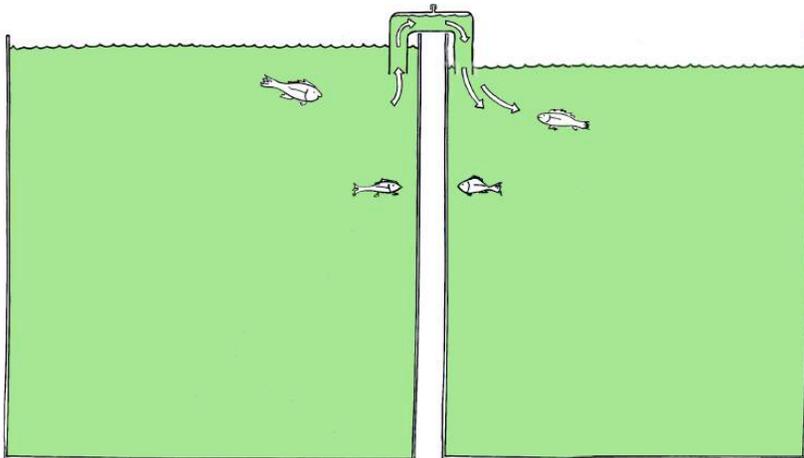
# What is a siphon?



# Siphons



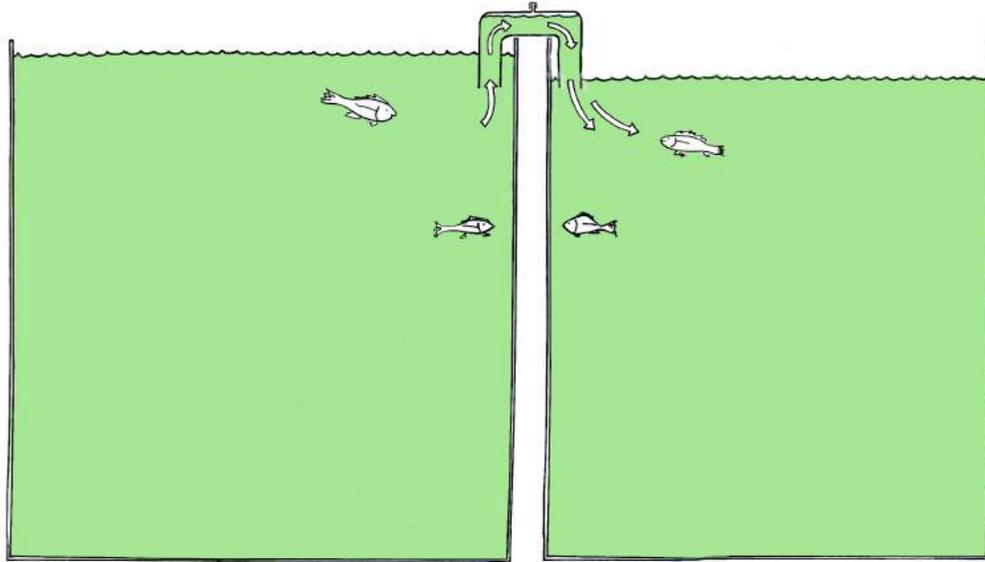
What is a siphon?  
Why use siphons?  
How to make a siphon  
How to start a siphon  
How to make a pond river  
Adding water to a pond river  
Using water from a pond river  
What is a Watery Artery?  
How to maintain a siphon  
Special Use  
Tips  
Materials & References  
Links



A siphon is an upside-down U-shaped tube filled with liquid, with each end submerged in a different container of liquid. If the level is higher in one container than the other, liquid will flow from the container with the higher level up through the siphon and then down into the lower level. This flow will continue until the levels of both containers are equal. Flow stops when the two ponds levels are equal.

The siphon's flow is a result of the force of gravity. The stored gravitational potential energy in the higher liquid level pushes the liquid through the siphon into the output tube.

# Why use siphons?



What is a siphon?  
Why use siphons?  
How to make a siphon  
How to start a siphon  
How to make a pond river  
Adding water to a pond river  
Using water from a  
pond river  
What is a Watery Artery?  
How to maintain a siphon  
Special Use  
Tips  
Materials & References  
Links

Siphons are a good way to move water between two ponds without making a permanent hole in the side of the ponds.

Siphons allow the water go over the rim of a pond instead of through the side.

Siphons are easier to construct than a permanent tube that is attached and sealed into the side of each pond.

Siphons are movable and are not connected to the ponds.

Siphons can be easily removed to disconnect ponds. The ponds can be moved and rearranged independently.

Several siphons can be used together to allow more flow without needing to make additional permanent connections.

If two ponds are connected by a siphon at the top, a leak in one pond will drain that pond down to the level of the leak, but the water in the other pond will only drain down to the level of the bottom of the siphon tube. But if two ponds are connected by a tubes at the sides near the bottom, a leak in one pond will drain both ponds (sometimes resulting in a fish dying in both ponds ).

# How to make a siphon

## Making a siphon using flexible rubber fittings.

materials:

- PVC clear plastic tubing 2 inches inside diameter.
- flexible rubber fittings with clamps
- brass barbed hose nipple fitting (for 1/8 inch diameter flexible tubing)
- clear silicone sealant
- flexible silicone air line tubing (standard 13/16 inches diameter)
- bamboo chopstick

how to:

- cut pieces of PVC clear plastic tubing (two 12" pieces and two 4" pieces)
- connect the pieces of tubing with flexible rubber fittings that clamp onto the tubing to make water-tight, air-tight connections. Make a U-shape with a straight fitting between two short tubes the top.
- drill a hole in the top center rubber fitting, slightly smaller than the fitting. Insert the small brass fitting pointing up. Apply clear silicone sealant around the fitting.
- connect a 3' piece of air line on the brass fitting, and insert a chopstick in the end of the air line.



What is a siphon?  
Why use siphons?  
How to make a siphon  
How to start a siphon  
How to make a pond river  
Adding water to a pond river  
Using water from a  
pond river  
What is a Watery Artery?  
How to maintain a siphon  
Special Use  
Tips  
Materials & References  
Links



## Making a siphon using permanently glued PVC fittings

### materials:

- PVC clear plastic tubing 2 inches inside diameter.
- flexible rubber fittings with clamps
- brass barbed hose nipple fitting (for 1/8 inch diameter flexible tubing)
- clear silicone sealant
- flexible silicone air line tubing (standard 13/16 inches diameter)
- bamboo chopstick

### how to:

- cut pieces of PVC clear plastic tubing (three 12" pieces)
- connect the tubing with rigid PVC fittings; permanently seal together with PVC solvent.
- drill a hole in the top tube, slightly smaller than the fitting. Insert the small brass fitting pointing up. Apply clear silicone sealant around the fitting.
- connect a 3' piece of air line on the brass fitting, and insert a chopstick in the end of the air line.



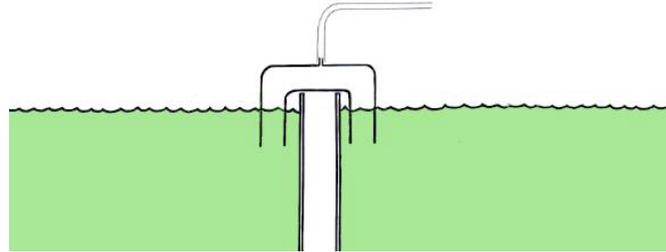
### Notes:

- 1) Clear tubing shows whether the siphon is full of water inside, whether the water is moving, and which way the water is moving.
- 2) The brass fitting is used to remove air from siphon.
- 3) The fittings connect the tubing to make the U-shape. The corner fittings can be angled at 60 or 90 degrees. The 90 degree shape is best. It is more stable, can extend deeper into the pond and interferes less with floating plants and aquaponics trays.



# How to start a siphon

The top of the siphon is initially filled with air.  
The airline tubing is for removing this air.



What is a siphon?  
Why use siphons?  
How to make a siphon  
How to start a siphon  
How to make a pond river  
Adding water to a pond river  
Using water from a  
pond river  
What is a Watery Artery?  
How to maintain a siphon  
Special Use  
Tips  
Materials & References  
Links

When air is sucked out from the top of the air line,  
water will rise up from the ponds into the tubes  
and fill the siphon completely with water.

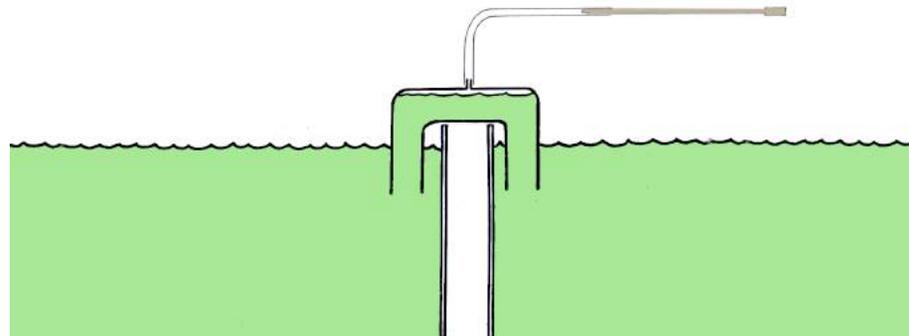
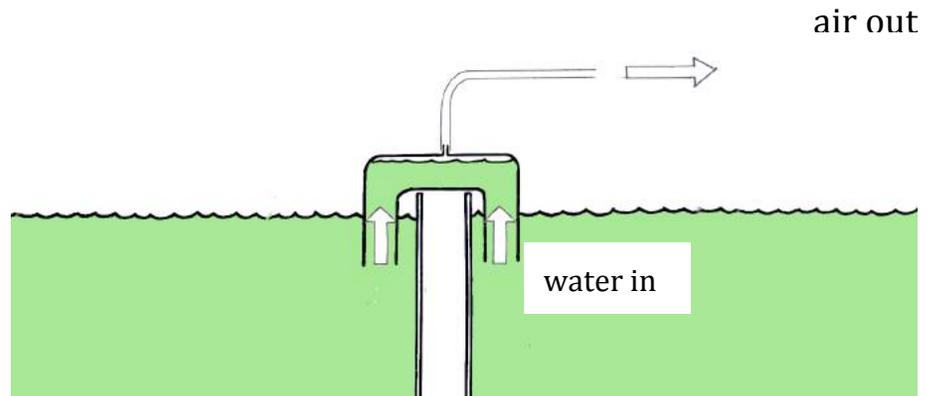
Air can be sucked out:

- with your mouth, like sucking through a straw.
- or
- by attaching a small hand-squeeze air pump,  
which can be carried from one pond to another.



Stop when the water starts to enter the air line.

Insert a chopstick in the end of the air line.  
When the siphon is full, it transfers water from  
one pond to another.

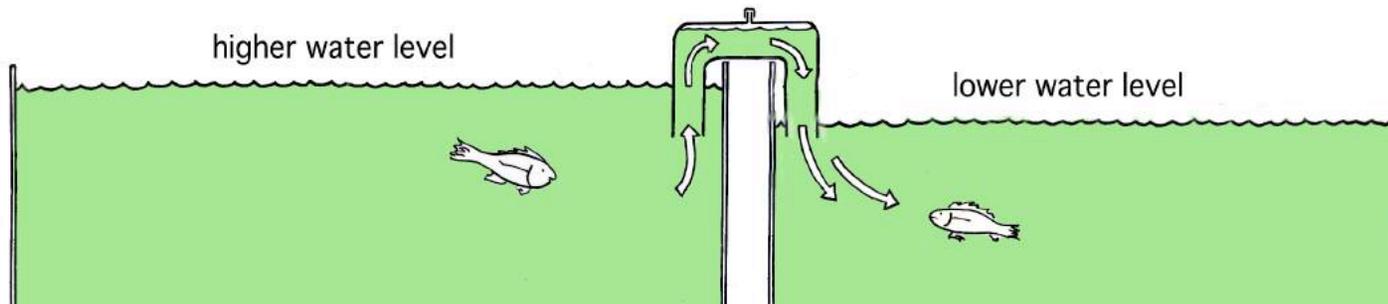


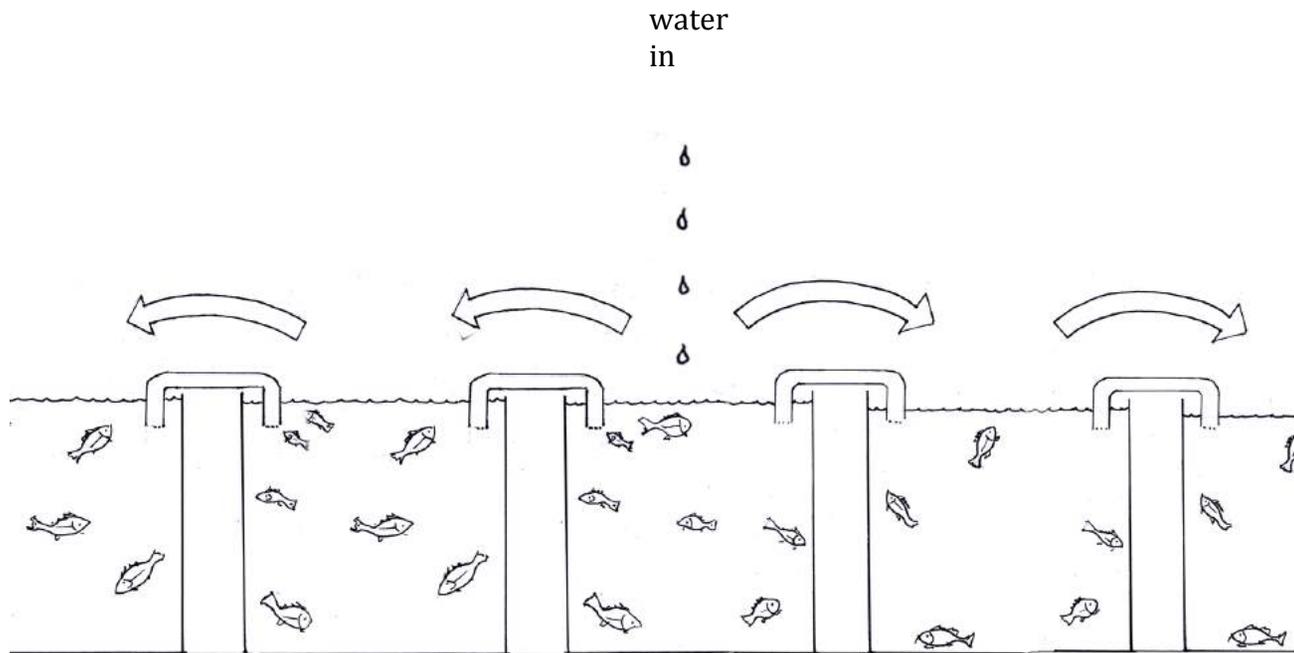
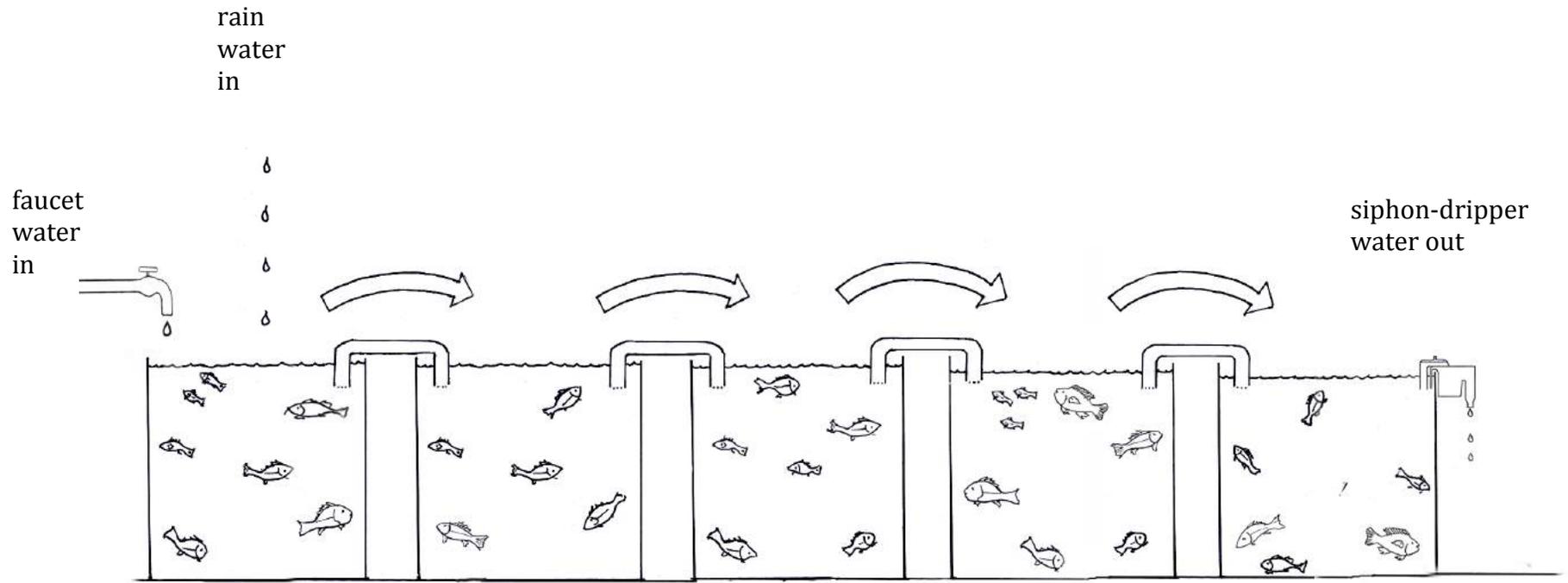
# How to make a pond river



What is a siphon?  
Why use siphons?  
How to make a siphon  
How to start a siphon  
How to make a pond river  
Adding water to a pond river  
Using water from a  
pond river  
What is a Watery Artery?  
How to maintain a siphon  
Special Use  
Tips  
Materials & References  
Links

A series of ponds can be connected with siphons forming a pond river. When water is added to the river, it will move from pond to pond. All ponds will fill until one or more ponds overflow over the top rim, or until water goes out of a pond for irrigation.

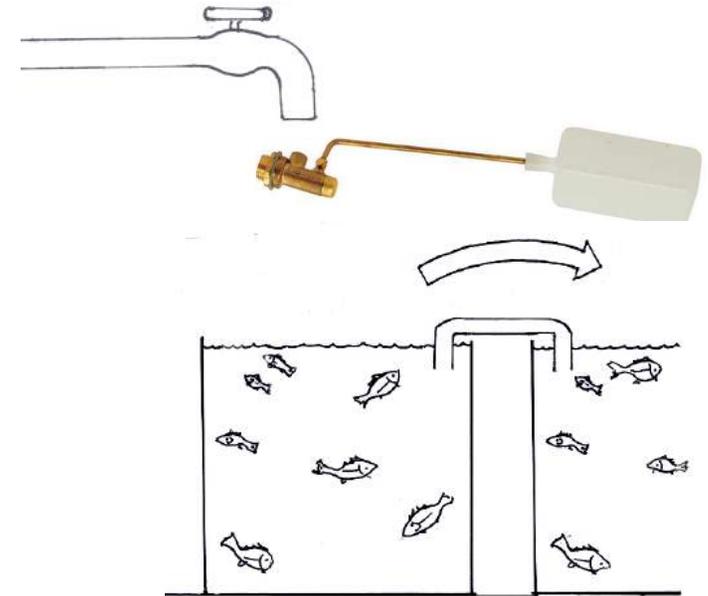
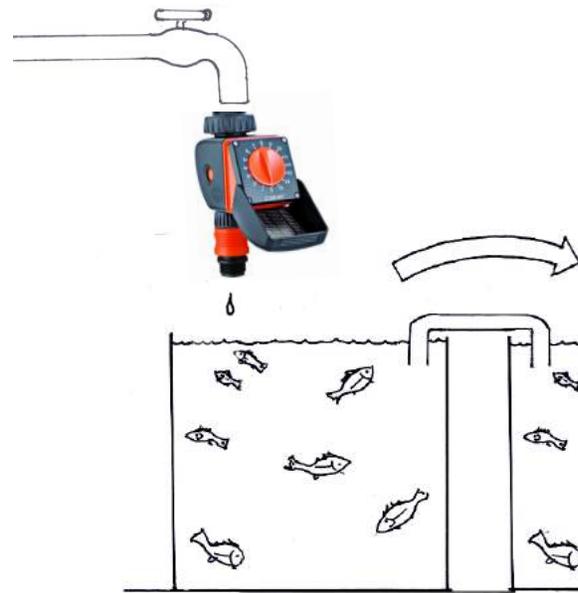
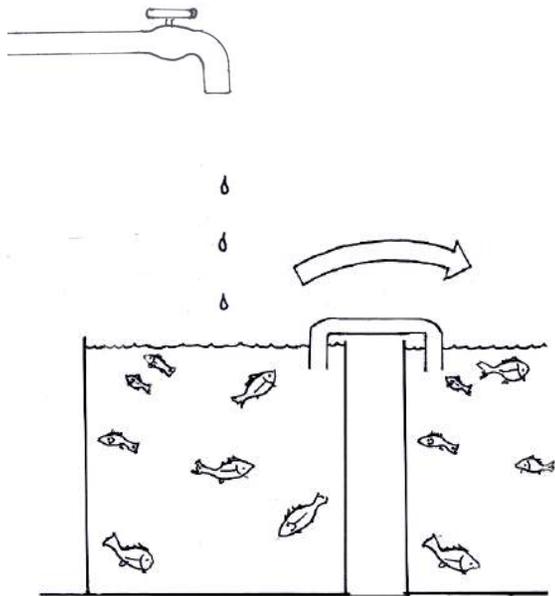




# Adding water to a pond river

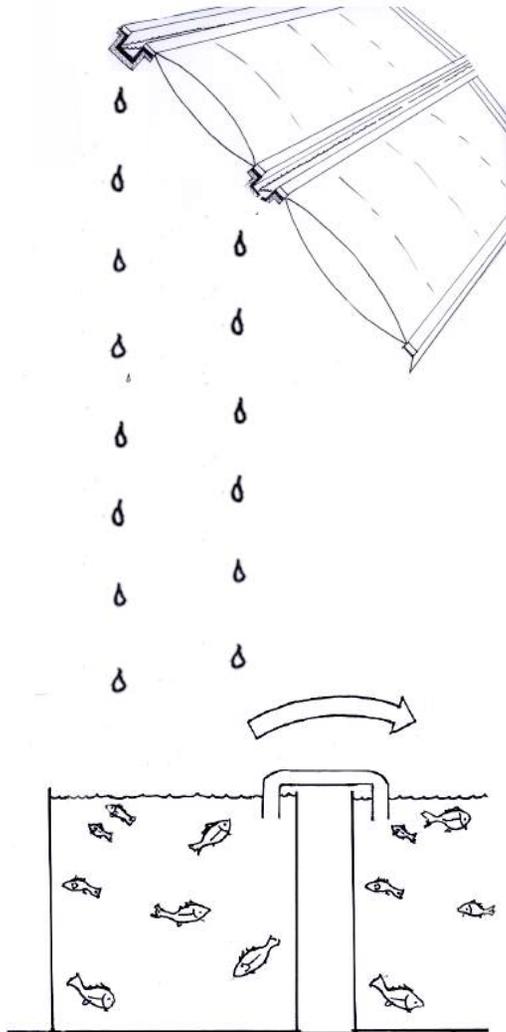
Water can be added by several methods at any point in the pond river by:

- 1) with a water faucet
  - a) directly
  - b) controlled by a timer that adds water periodically
  - c) controlled by a float-valve that adds water when the level goes down, to keep the pond filled to a chosen level

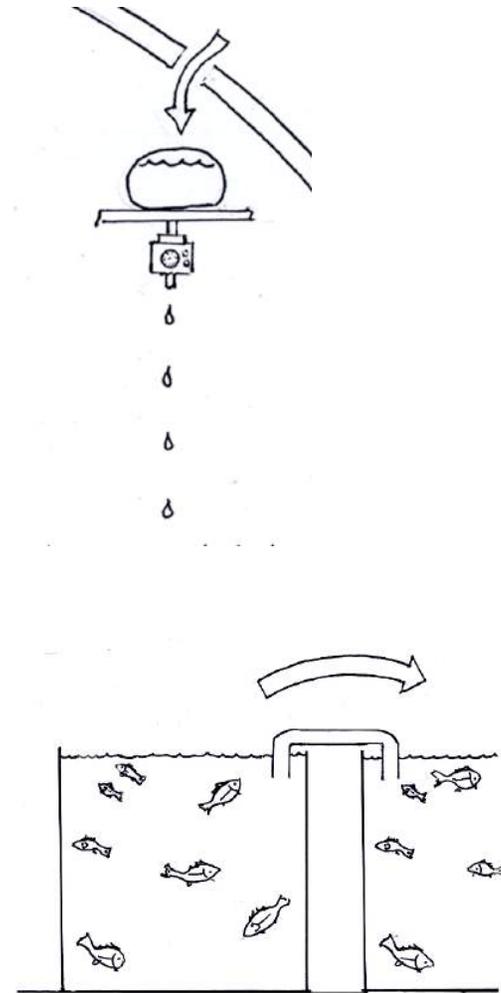


What is a siphon?  
Why use siphons?  
How to make a siphon  
How to start a siphon  
How to make a pond river  
Adding water to a pond river  
Using water from a  
pond river  
What is a Watery Artery?  
How to maintain a siphon  
Special Use  
Tips  
Materials & References  
Links

2) rain water from a roof



3) water stored above and released by a timer



# Using water from a pond river

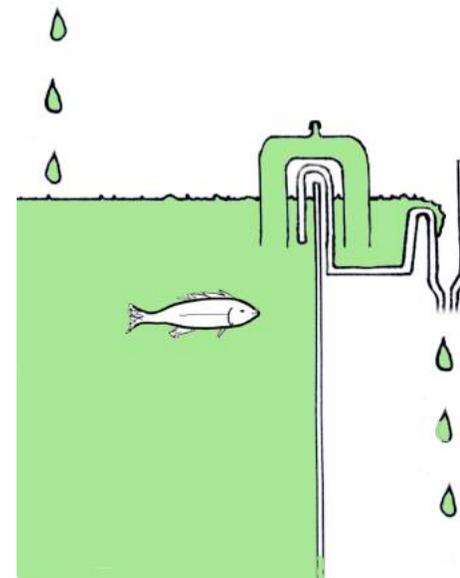
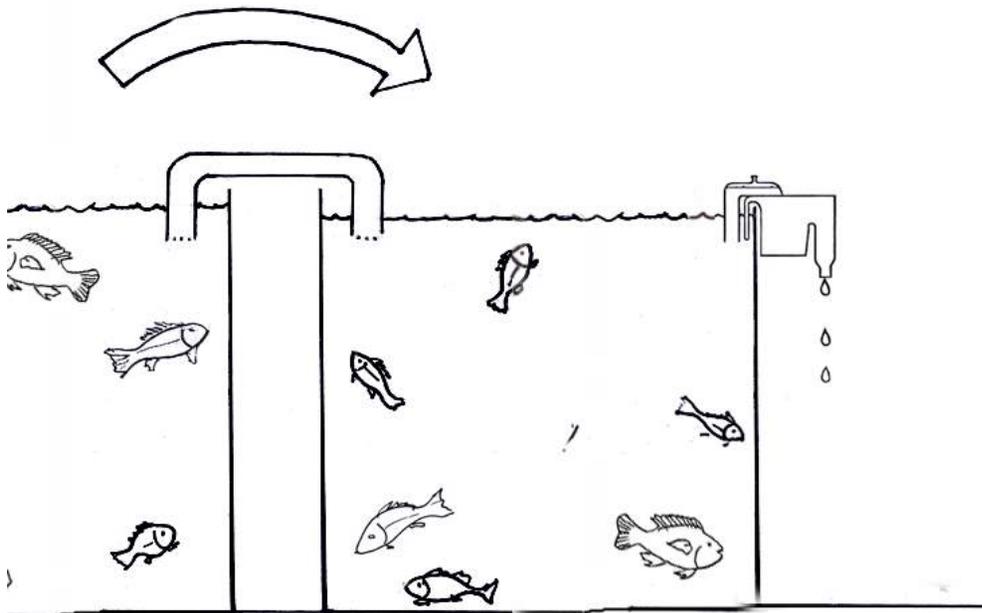
A river of ponds connected by siphons can move water a long distance to irrigate indoor or outdoor gardens.

Water can leave a pond river by five different ways:

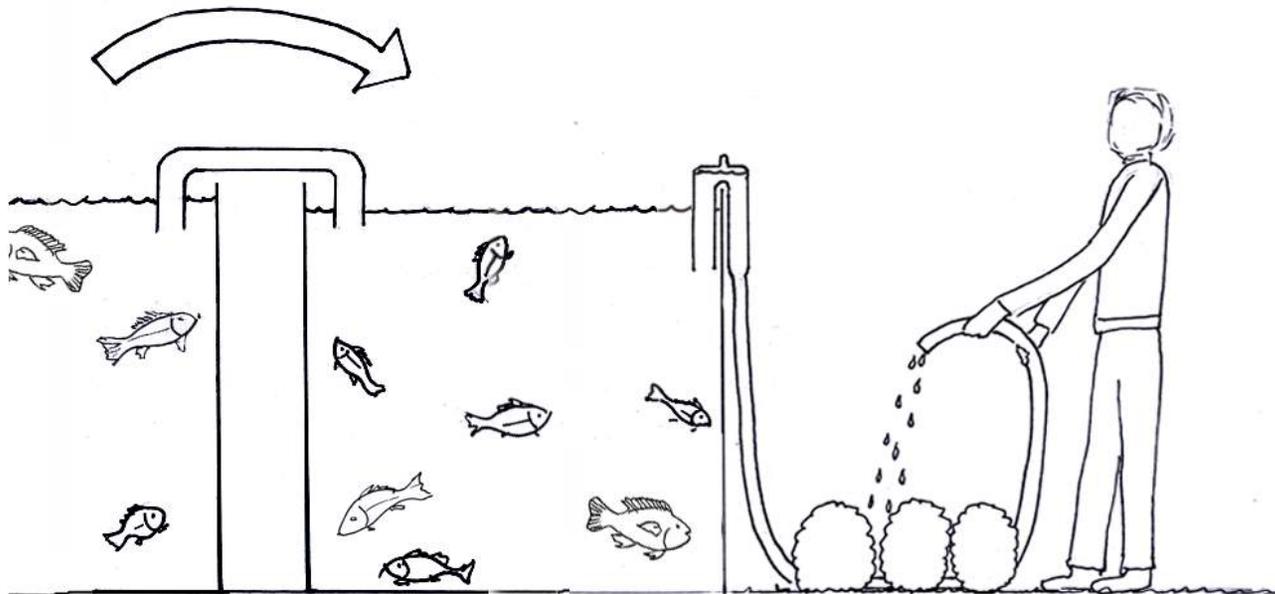
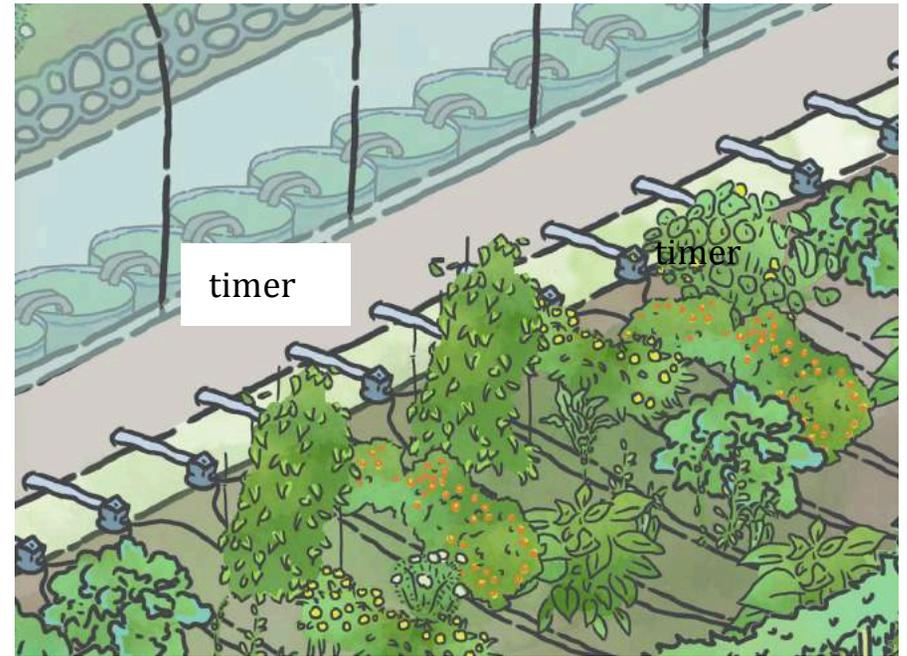
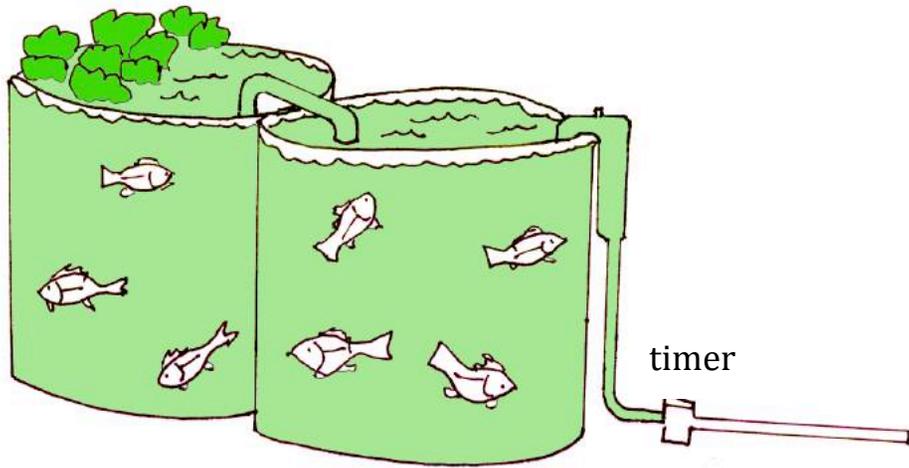
- 1) by a siphon dripper
- 2) by a siphon connected to a timer on an irrigation line
- 3) by a siphon and hose regulated by a person
- 4) by accidental overflowing, if a siphon in the river fails
- 5) by accidental draining from a leak in a pond

a siphon dripper is a siphon going into a small container hanging on the outside rim of a pond. When water rises in a pond, it flows through the siphon into the small container, which overflows into a hose or irrigation tube.

What is a siphon?
Why use siphons?
How to make a siphon
How to start a siphon
How to make a pond river
Adding water to a pond river
Using water from a pond river
What is a Watery Artery?
How to maintain a siphon
Special Use
Tips
Materials & References
Links



drained from a pond by siphon and timer



siphon and hose

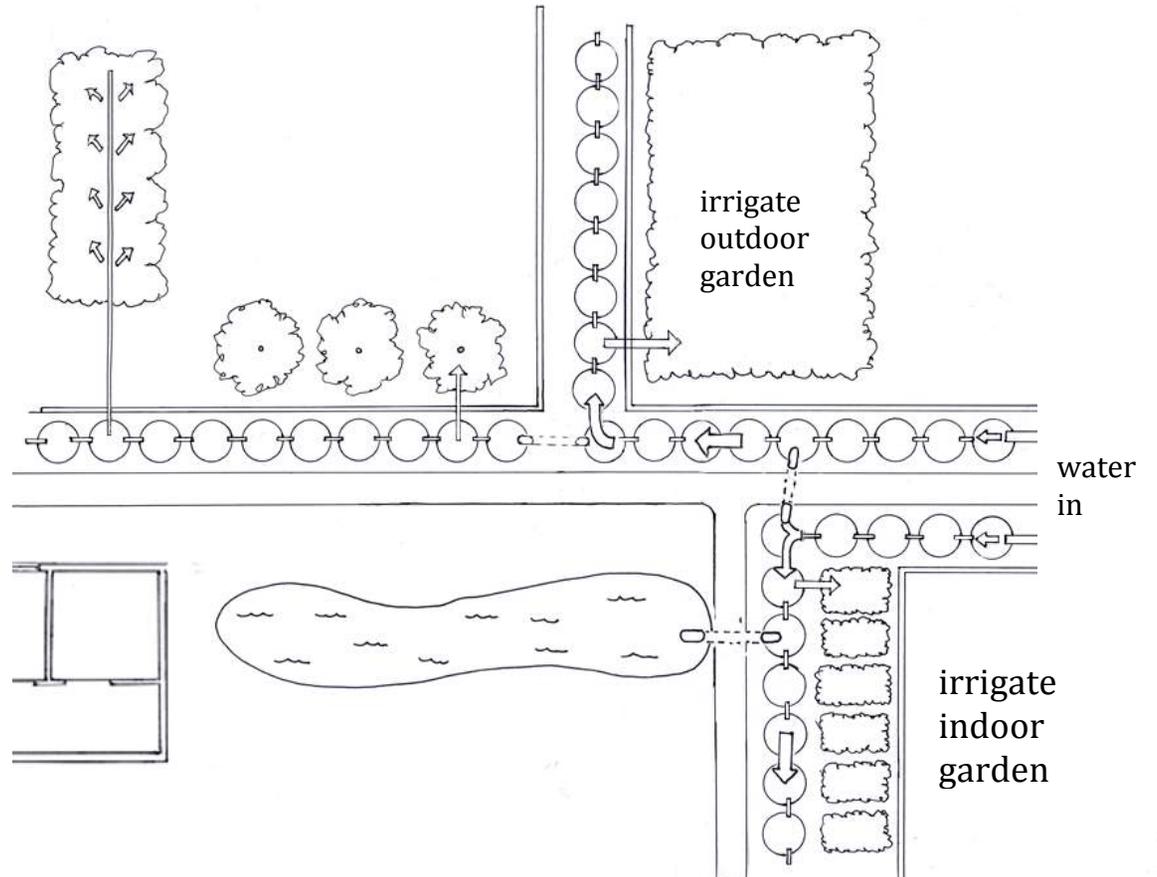
# Watery Arteries

A watery artery is a network of pond rivers.

Pond rivers can be connected to merge together or divide and flow in different directions.

A network of pond rivers can accept new water at any point and deliver it to any other location in the network.

What is a siphon?  
Why use siphons?  
How to make a siphon  
How to start a siphon  
How to make a pond river  
Adding water to a pond river  
Using water from a pond river  
What is a Watery Artery?  
How to maintain a siphon  
Special Use  
Tips  
Materials & References  
Links



# How to maintain a siphon

- A siphon completely full of water and no air will operate best.
- A siphon partially filled with air will continue to work, but less water will flow.
- A siphon with the entire horizontal tube full of air will stop working.

When air is sucked out from the top of the air line, water will rise up from the ponds into the tubes and fill the siphon completely with water.

Air can be sucked out:

- with your mouth, like sucking through a straw.

or

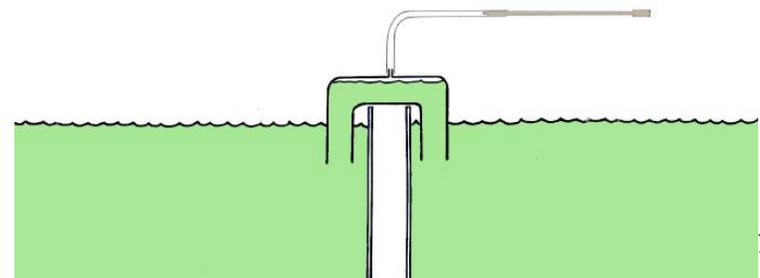
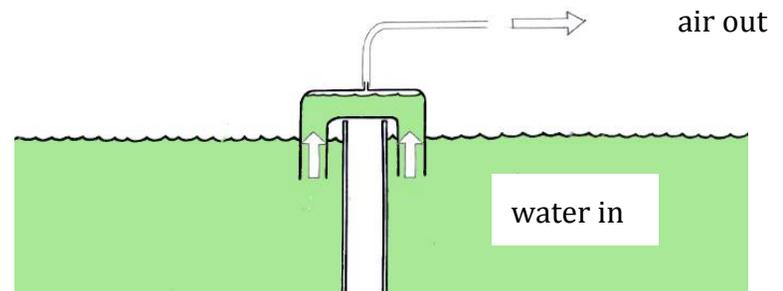
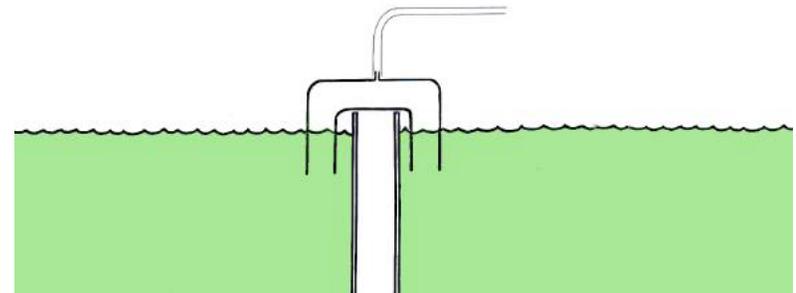
- by attaching a small hand-squeeze air pump, which can be carried from one pond to another.

Stop when the water starts to enter the air line.

Insert a chopstick in the end of the air line.

When the siphon is full, it transfers water from one pond to another.

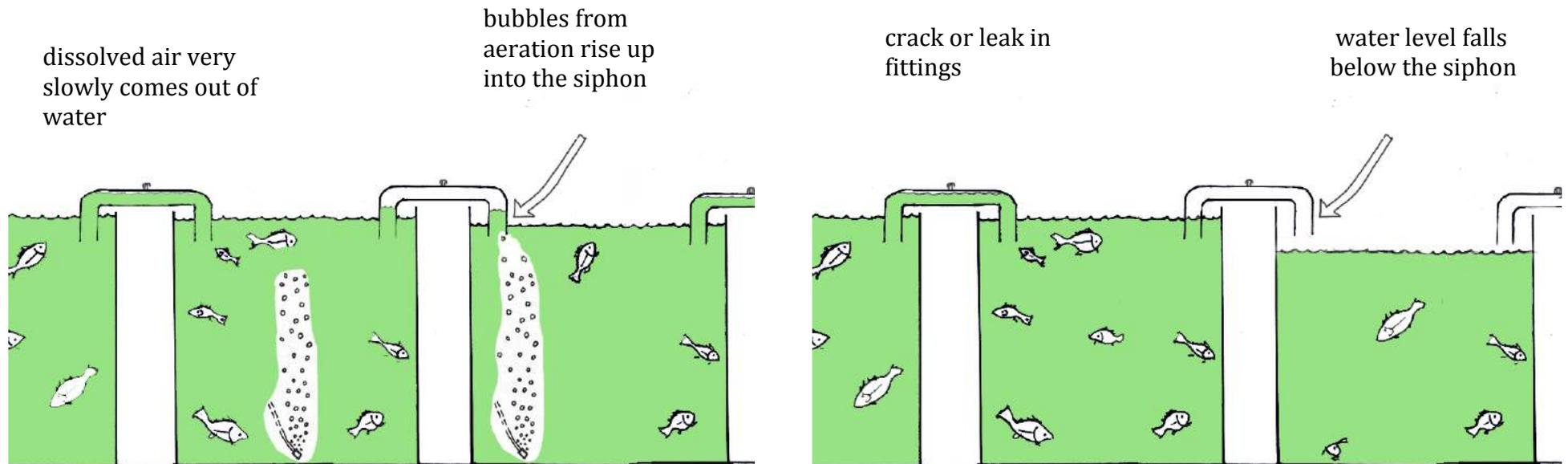
<  
irrigate  
outdoor  
garden



## Note:

There are four ways air can get accidentally into a siphon:

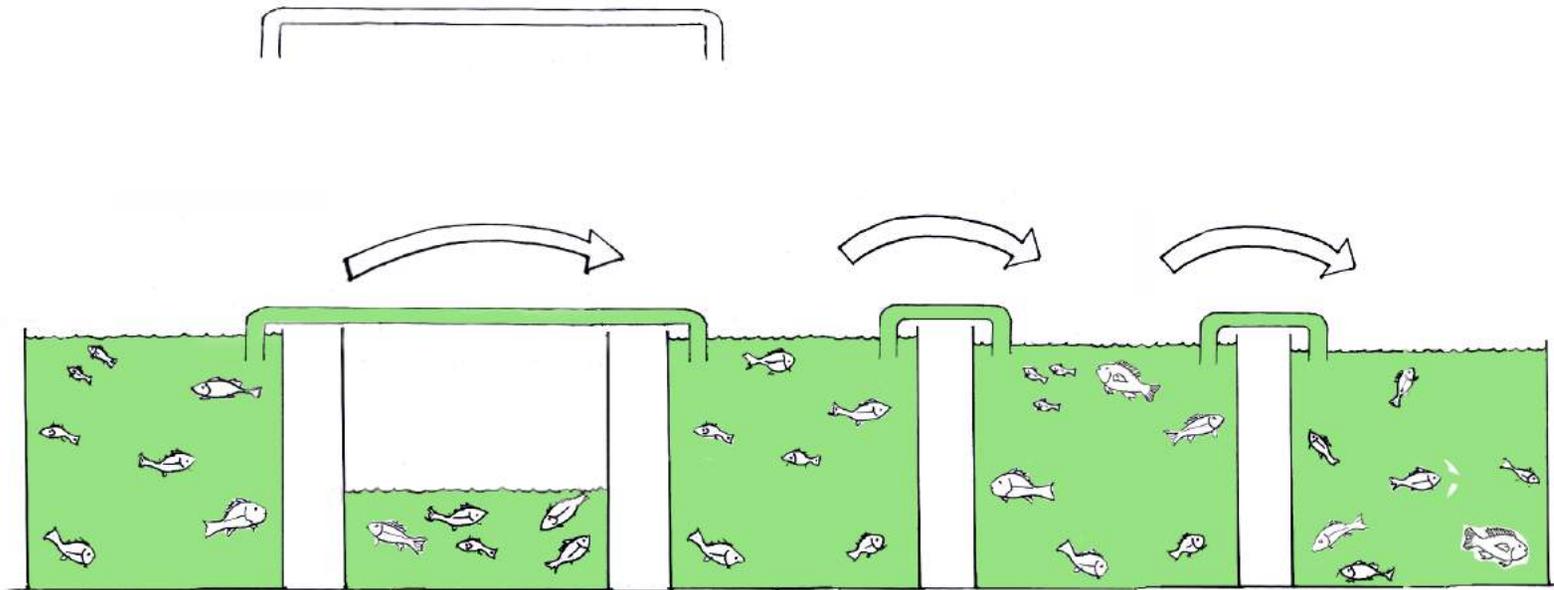
1. Air coming out of the water in the siphon. Water always has some air dissolved in it. That air can come out of solution as a bubble due to low pressure in the upper part of siphon Air leaks where the fittings meet the tubes.
2. Bubbles accidentally caused by stirring or splashing the water in the pond, or from bubbles from an aeration bubbler in the pond.
3. The connections between the fittings and tubes must be completely water-tight and air-tight. If there is even a small leak or crack, air will accumulate in the top of the siphon. Rubber fittings with clamps can be tightened. PVC joints can be sealed with silicone sealant.
4. The water level in a pond can go below the bottom end of one leg of the siphon. This can be accidental if the pond has a fast leak, or if too much water is drained out for irrigation. Then air will go up into the siphon and fill the top, and it will stop working.



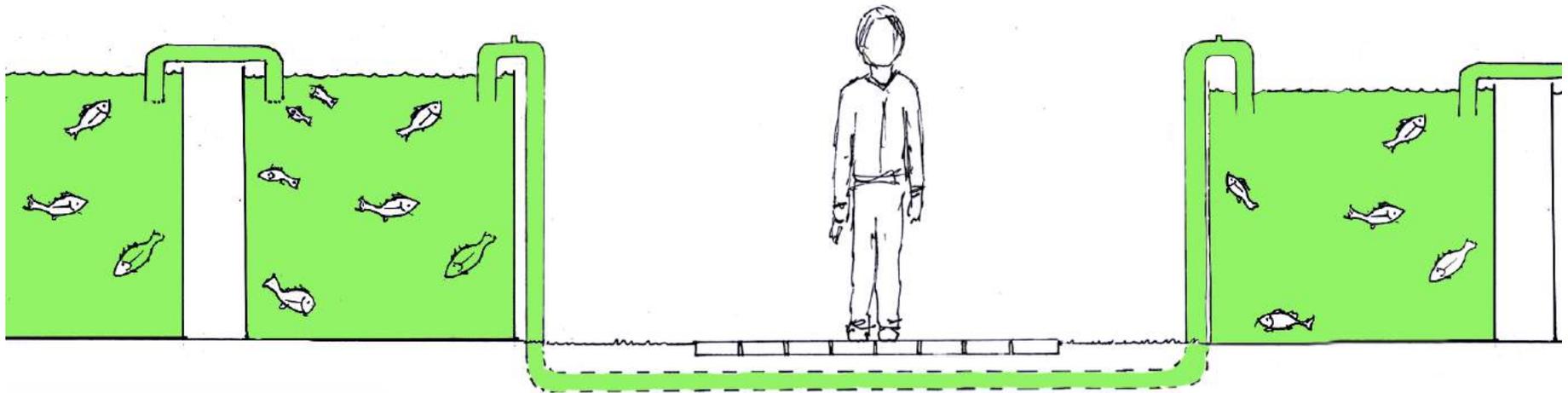
# Special uses

A long siphon can be used to pass over one or more ponds in a series, separating it from the flow of water. The skipped pond (or ponds) to be emptied for cleaning or harvesting fish. Water continues to flow through the rest of the ponds.

What is a siphon?  
Why use siphons?  
How to make a siphon  
How to start a siphon  
How to make a pond river  
Adding water to a pond river  
Using water from a  
pond river  
What is a Watery Artery?  
How to maintain a siphon  
Special Use  
Tips  
Materials & References  
Links

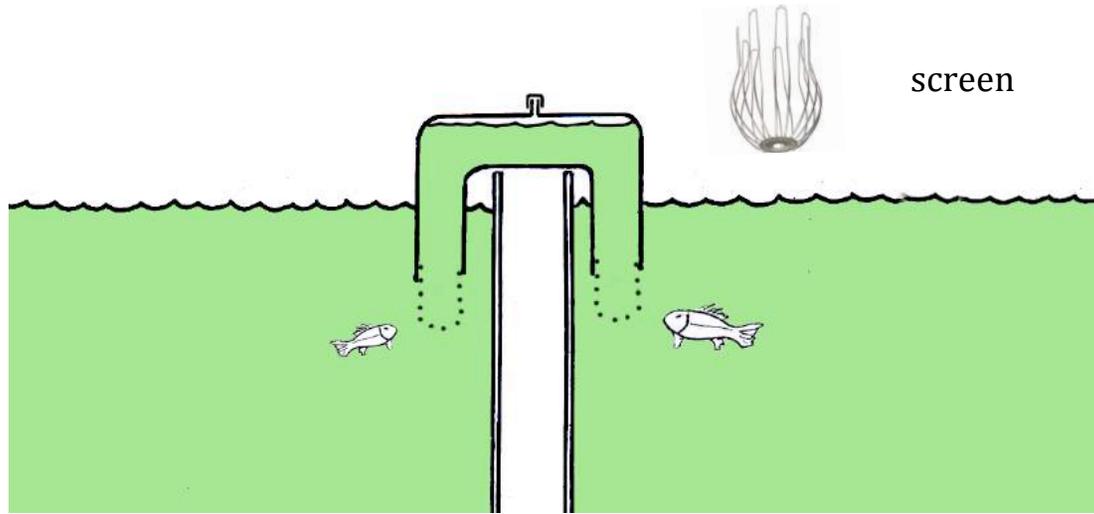
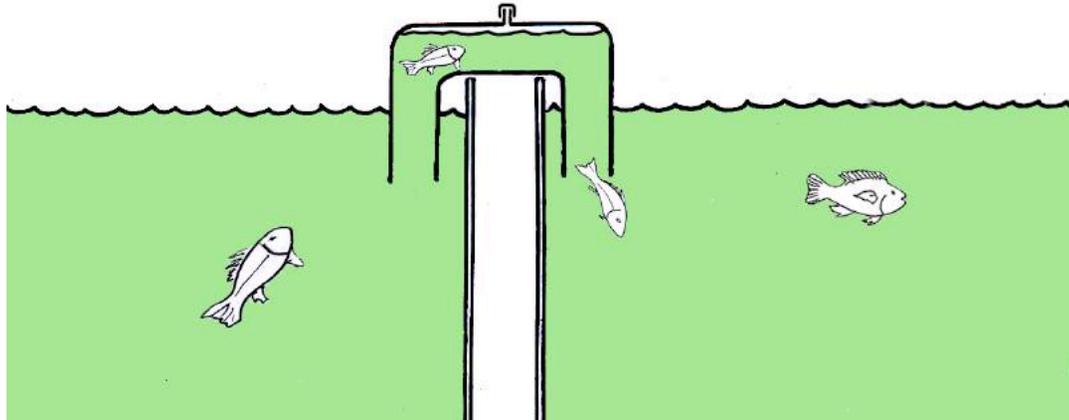


A buried siphon can be used to pass underground between two ponds.



# Tips

Fish can swim through siphons from one pond to another.  
Attach a screen at the bottom of one or both of the siphon tubes.



- What is a siphon?
- Why use siphons?
- How to make a siphon
- How to start a siphon
- How to make a pond river
- Adding water to a pond river
- Using water from a pond river
- What is a Watery Artery?
- How to maintain a siphon
- Special Use
- Tips
- Materials & References
- Links

# Materials & References/Links

## Materials

ponds- made of Kalwall fiberglass by Solar Components Division of Kalwall Corporation.

[www.solar-components.com](http://www.solar-components.com)

siphon fittings – plumbing supply companies

## References

Green Center website – [www.newalchemists.net](http://www.newalchemists.net)

## Links

### Links to Greenway videos:

- "Follow the Water"
- "Watch the Nutrients Cycle"
- "Watch the Energy Flow"
- "Transport"

### Links to Greenway Topics Explanations

## Contact:

Earle Barnhart [capecodalchemists@gmail.com](mailto:capecodalchemists@gmail.com)

The Green Center [www.newalchemists.net](http://www.newalchemists.net)

What is a siphon?  
Why use siphons?  
How to make a siphon  
How to start a siphon  
How to make a pond river  
Adding water to a pond river  
Using water from a  
pond river  
What is a Watery Artery?  
How to maintain a siphon  
Special Use  
Tips  
Materials & References  
Links

