

Water Flow

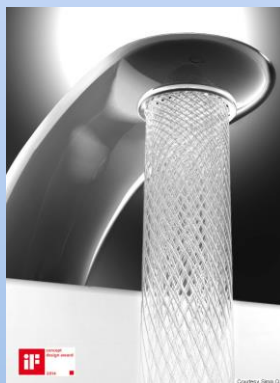
Water is pumped to the tops of skyscrapers,
between fields and cities, and everywhere in
between.

Moving water efficiently is an important area of
research in engineering.

Water Flow Hints



Image by [orca13p](#) from [Pixabay](#)



MANY inventions have been inspired by the vortex created from water flow. Here is one example of a faucet that conserves water using a vortex.

Think about the relationship between form and function.

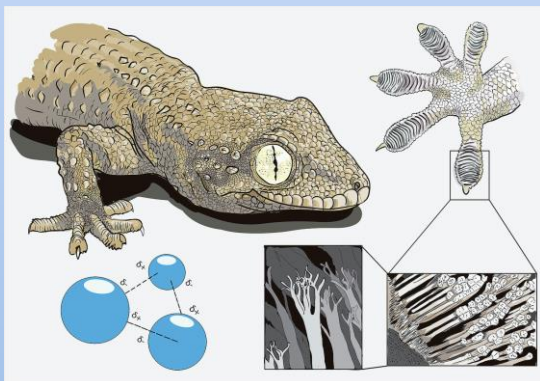
Other water flow ideas:

- Roots/trees – capillary action, xylem
- Water cycle
- Currents

Adhesion

From your tennis shoes to your desk at school, adhesives or glues are a major part of our world. Finding non-toxic and high-performance solutions would have wide value in human technologies.

Adhesion Hints



https://commons.wikimedia.org/wiki/File:Gecko%27s_secret_power_-_Matteo_Gabaglio.jpg

Geckos have inspired design in many ways, including Geckskin created by researchers at the University of Massachusetts Amherst.

What features allow geckos to stick to surfaces to climb so well?

Other adhesion ideas:

- Barnacle
- Snail foot
- Byssal threads with mussels
- Squid Suckers
- Coral attachments

Filter

Lots of organisms filter, and human technologies (e.g., air ducts) require effective filtering as well.

Filter Hints



There are many organisms that filter water to eat. They remove unwanted objects and only keep what is helpful or important.

Others filter ideas:

- Countercurrent exchange system in circulatory/respiratory systems
- Peat – salt marshes
- Filter feeders (baleen whales, planktivorous sharks, gill rakers)
- Gills/lungs
- Plants



Cleaning

Nature doesn't use detergents to clean. What are some other ways nature uses?

Cleaning Hints



[7597017388_06f0b81243_b.jpg](#)

This is a cleaner shrimp on an eel. It may look like the eel is eating the shrimp, but actually the shrimp is eating ectoparasites and dead skin for its meal, and the eel is getting cleaned.

How can organisms be used to clean our environment?

Other cleaning ideas:

- Plants ([lotus](#), kale)
- Birds – preening
- Cleaning stations in marine environments

Waste Removal

In nature, there really is no such thing as waste. In contrast, humans produce about 96% waste for every 4% product. Could we learn a better way to make what we need?

Waste Removal Hints



Other waste removal ideas:

- Algae (nutrients from waste)
- Plants/trees (carbon usage)
- Scavengers/detritivores
- Insects
- Mushrooms

Carbon Storage

Removing and storing carbon is, of course, a critical issue given climate change. Models in the natural world have been managing carbon for millions of years.

Carbon Storage Hints



Other ideas for carbon storage:

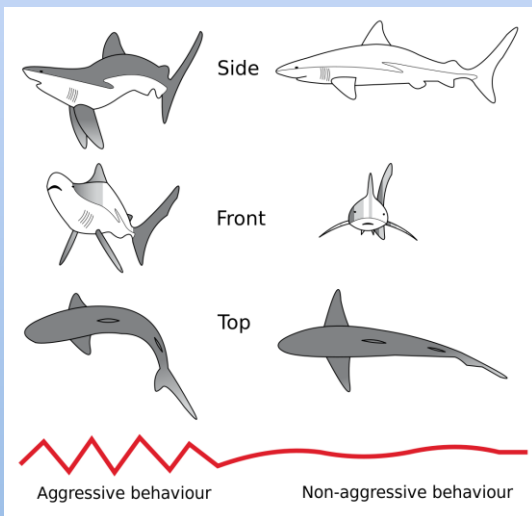
- Soil
- [Tree/plants](#) (video)



Communication

Information plays a major role in human technologies,
from cell phones to computer systems.
What could nature teach us?

Communication Hints



https://commons.wikimedia.org/wiki/File:Shark_threat_display.svg

Look at the picture to the left.
How is the shark changing or modifying its features (form)?
What is the purpose of this change (function)?

What are other ways that organisms communicate?

Other communication ideas:

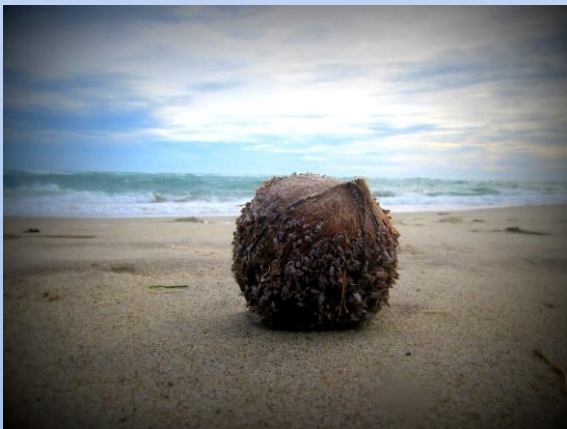
- Tree roots in a forest
- Animal sounds
- Color
- Behavior

Movement/Transport

Nature has many different methods for movement.

What ways can you think of? Can we learn more environmentally friendly ways to move from nature?

Movement/Transport Hints



https://commons.wikimedia.org/wiki/File:Sea_shells_on_top_of_a_coconut.jpg

Coconuts are hollow and can float. Why would these be important features? Can you think of any design or inventions that mimic this?

Other ideas for movement/transport:

- Seeds
- Body parts
- Water cycle
- Weather Patterns
- Spirals – hurricanes, growth of shells, water drainage

Recycling

Recycling is an important and sometimes complex function. What are some of the ways nature has to solve this necessary function?

Recycling Hints



Other recycling ideas:

- Water cycle
- Mushrooms
- Detritivores
- Food chain or webs
- Whole ecosystems

