

# Wastewater - Its Journey to Treatment and Return to the Environment



FGUA/Jon Meyer

# Where does it all go!

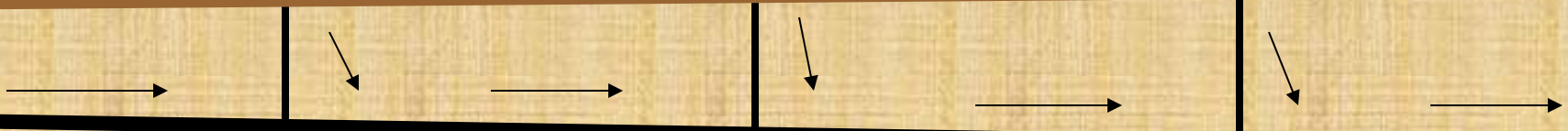


Where does the water from the washer go?



When you flush the toilet where does the contents go?

By gravity flow and pumps, the waste is on its way to your local wastewater treatment plant!



# Why treat wastewater?

- Causes a demand for dissolved oxygen (lower DO levels of streams)
- Adds nutrients (nitrate and phosphate) to cause excessive algae growth
- Increases suspended solids or sediments in streams making the water cloudy (turbidity increase)

# How is Wastewater Treated

- Physically
- Biologically
- Chemically

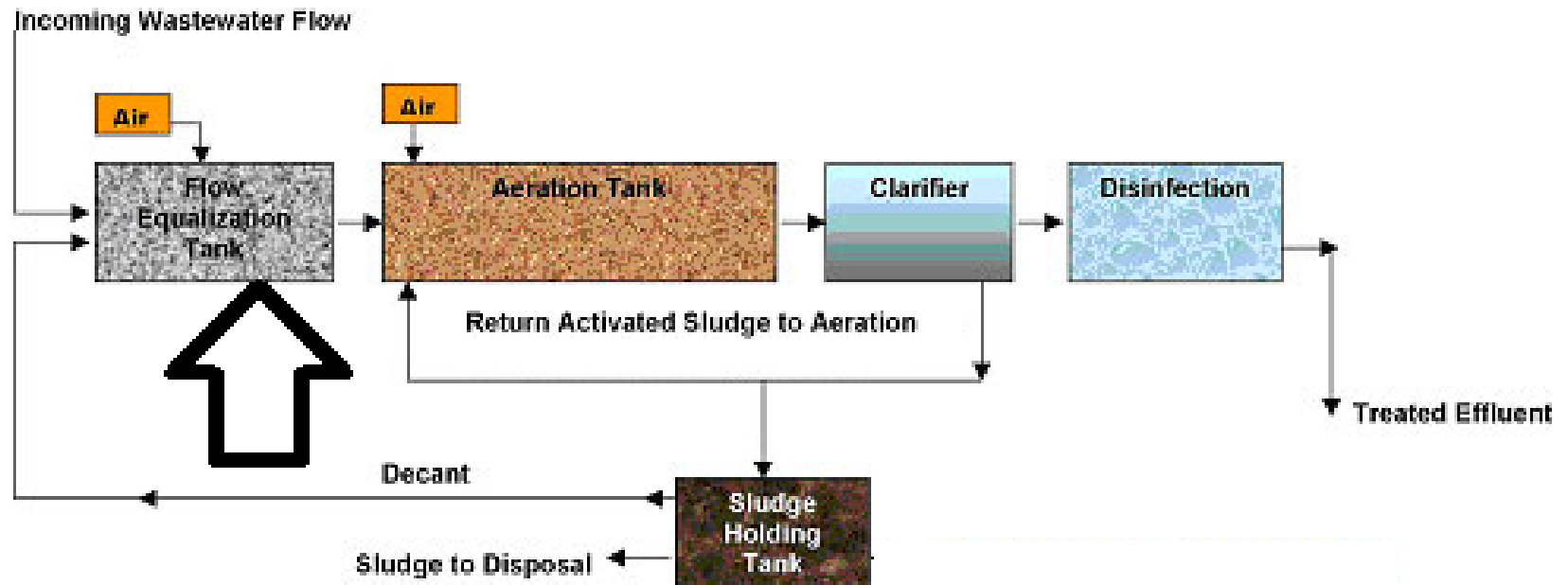
# How is Wastewater Treated

- Physical-
  - Large non-biodegradable material is removed using a screening device.
  - Grit and other non-biodegradable material is removed by settling.



# Flow Equalization

## TREATMENT PROCESS FLOW CHART

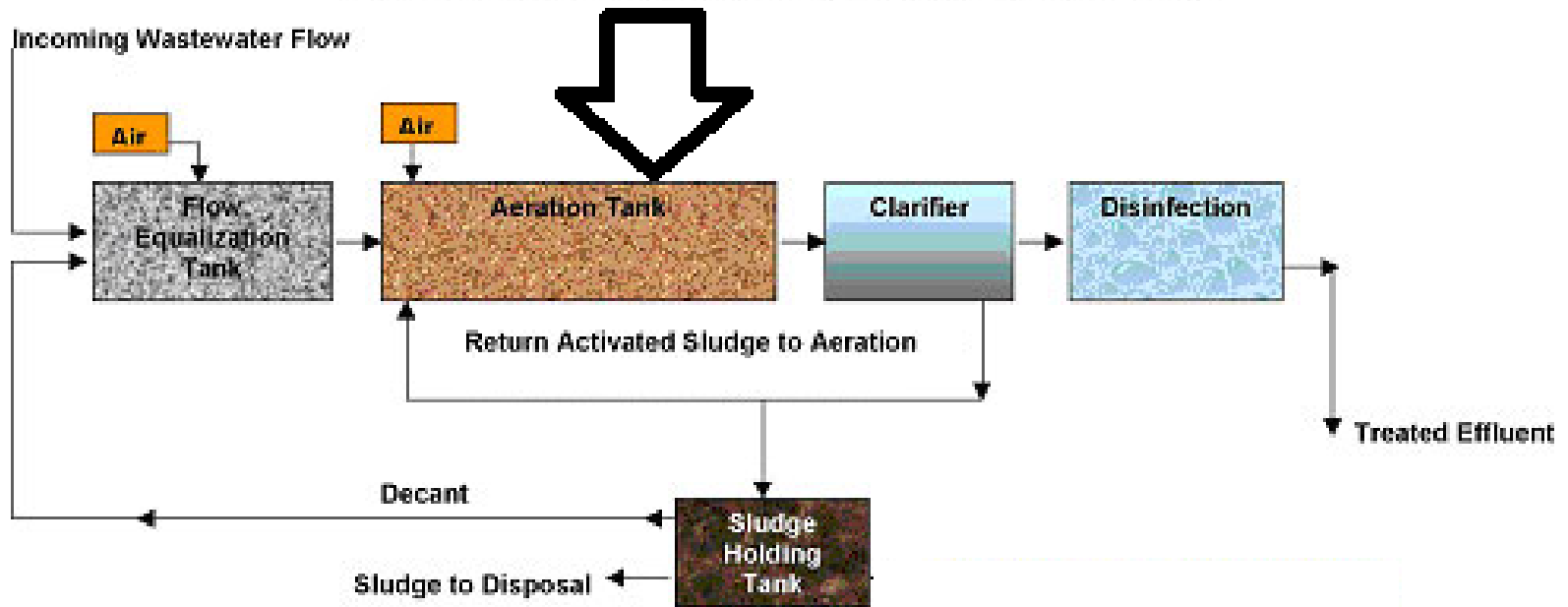


# Flow Equalization

- Flow to the plant from homes and businesses varies throughout the day
- Wastewater treatment plants work best under stable conditions.
- The objective of flow equalization tanks are to aerate and store incoming flow and dose it to the down stream processes evenly.

# Biologically

## TREATMENT PROCESS FLOW CHART





# Biologically

- Screened and de-gritted wastewater enters the aeration tank where microorganisms eat the bio-degradable material (aka food), grow and reproduce.
- The objective of the operator is to create an environment in the aeration tank that provides ideal conditions for the microorganisms to convert all of the pollutants into more microorganisms, water and gasses.

# Aeration Basis/Tank

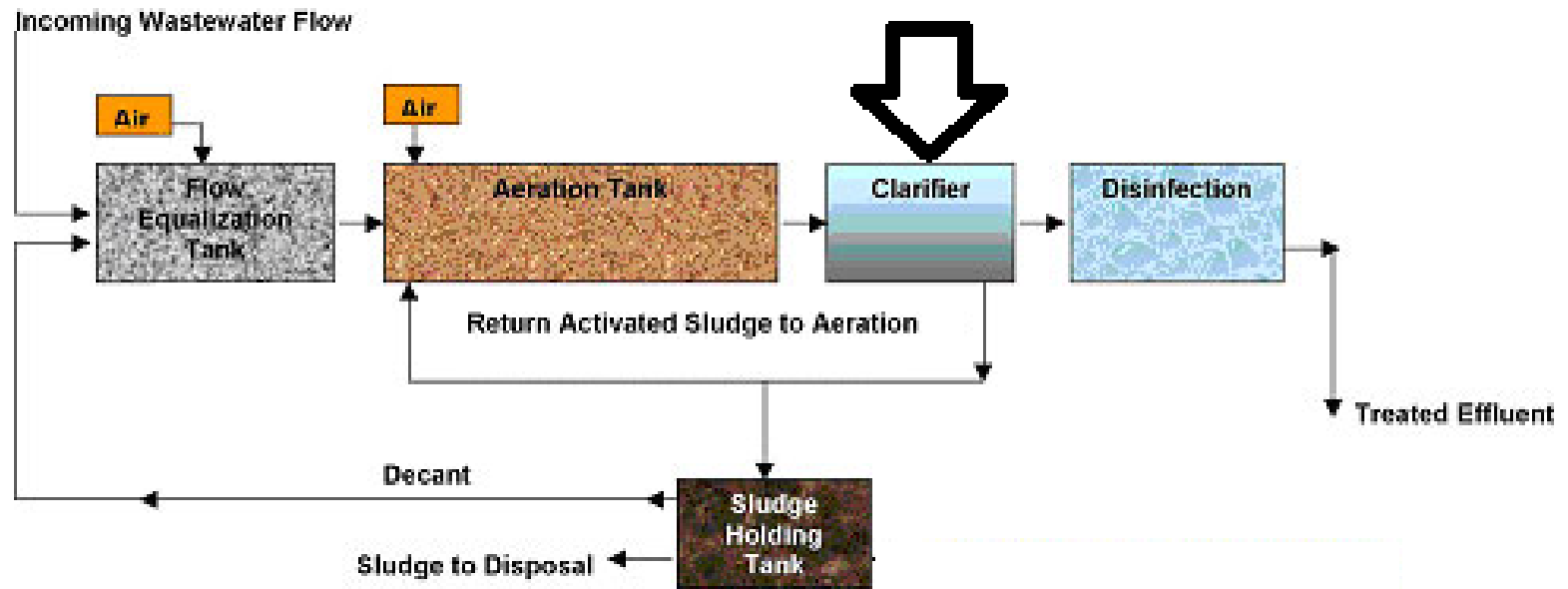


# Biologically- continued

- To ensure the right environment in the aerations tank to allow the microorganisms to do their job, there must be sufficient:
  - Time- allowing the microorganisms time to eat.
  - Oxygen- like humans the microorganisms require oxygen
  - Mixing
  - Balance between the food and the population of microorganisms
  - Non-toxic conditions
  - Proper temperature and pH
  - Temperature

# Clarification/Settling

## TREATMENT PROCESS FLOW CHART





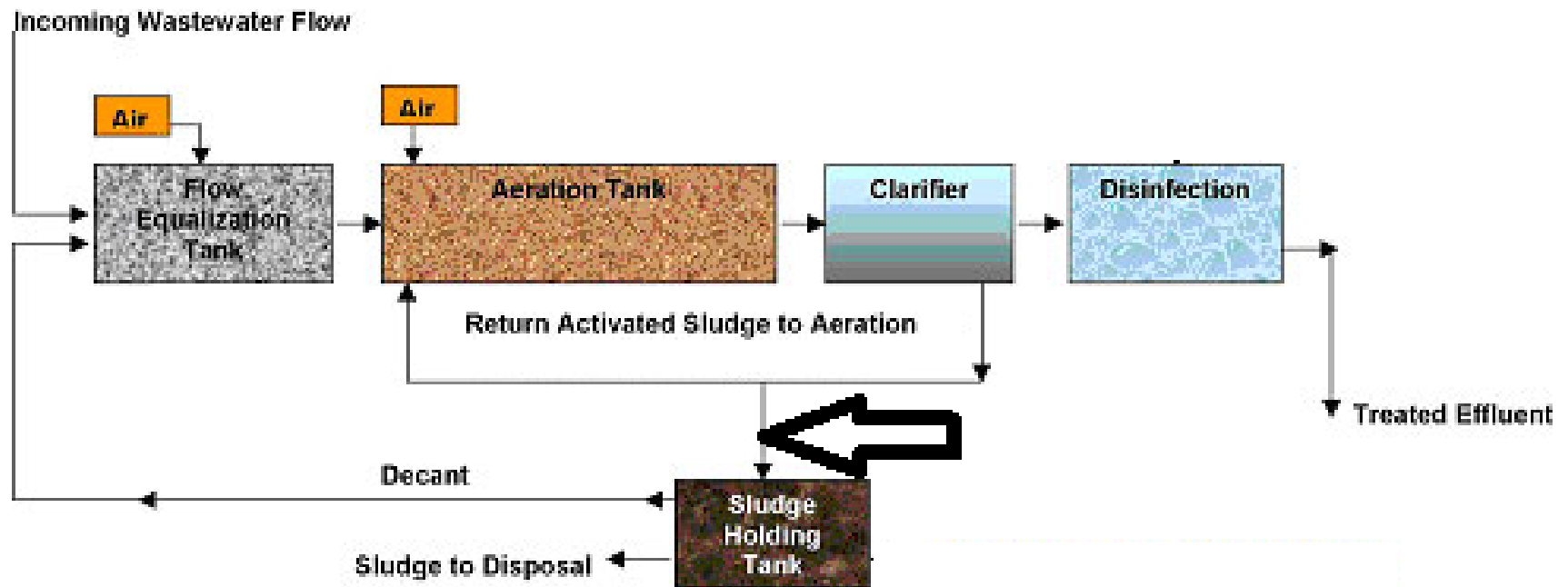
# Clarification/Settling

- Physically (again)
  - With all of the biodegradable material consumed by the microorganisms the next step is settling them in a clarifier.
    - By slowing the velocity of the water in the clarifier, the microorganisms settle to the bottom of the clarifier tank, are collected and returned back to the aeration tank to eat incoming waste again.



# Microorganism / Food Balance

## TREATMENT PROCESS FLOW CHART

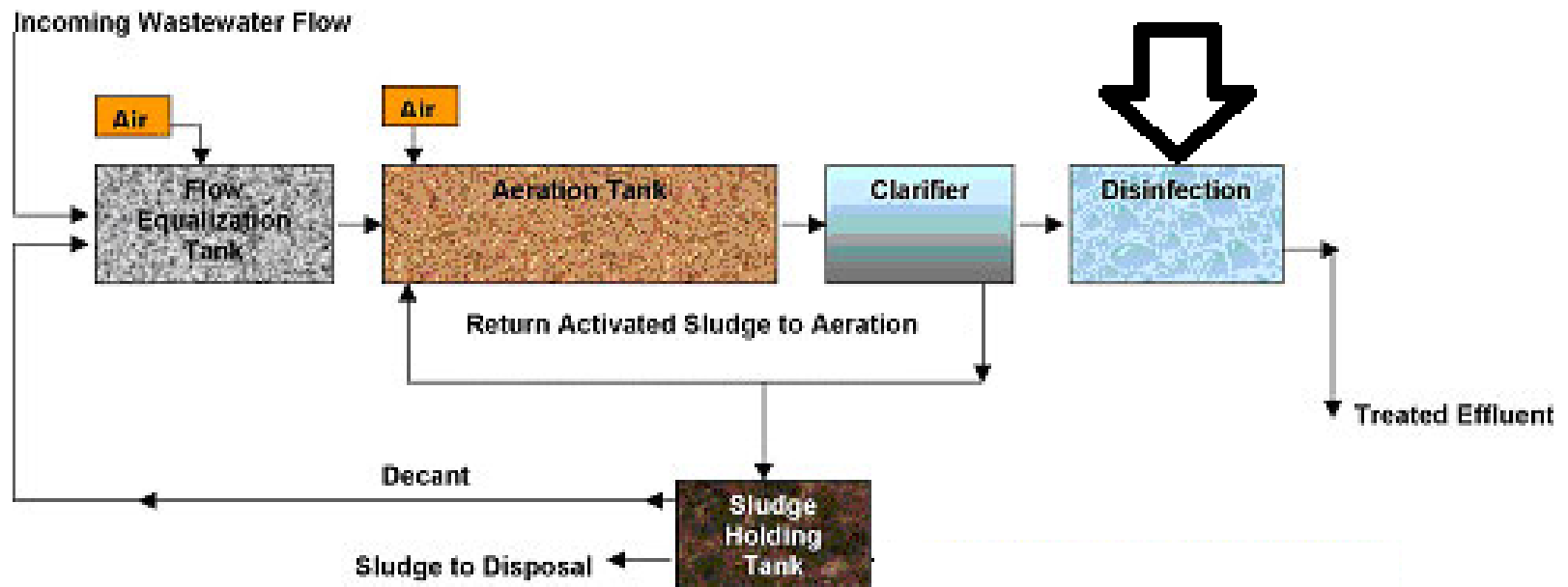


# Microorganism / Food Balance

- To maintain a balance between the waste (biodegradable food) coming into the plant and the microorganism population some of microorganisms must be removed from the process. This is called wasting activated sludge.
- This material is collected in the sludge holding tank or digester, hauled and disposed of at the landfill to be used as cap.

# Chemical Treatment

## TREATMENT PROCESS FLOW CHART



# Chemical Treatment

- Disinfecting chemicals are added to the treated plant discharge or effluent to ensure no harmful bacteria are being introduced into the environment.

# Role of the users

- Treatment plant operation can be very difficult because the system depends on living, breathing bacteria. You can improve the effectiveness of the process by:
  - Not pouring oil and grease in the sewer system
  - Minimize putting non-biodegradable materials in the sewer system
  - Report all suspicious activity associated with manholes.



# Questions