



# Water Conservation: Save Water & Money

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# Rutgers Cooperative Extension

Rutgers Cooperative Extension (RCE) helps the diverse population of New Jersey adapt to a rapidly changing society and improves their lives through an educational process that uses science-based knowledge.



Photos: Newark, NJ

# Water Resources Program

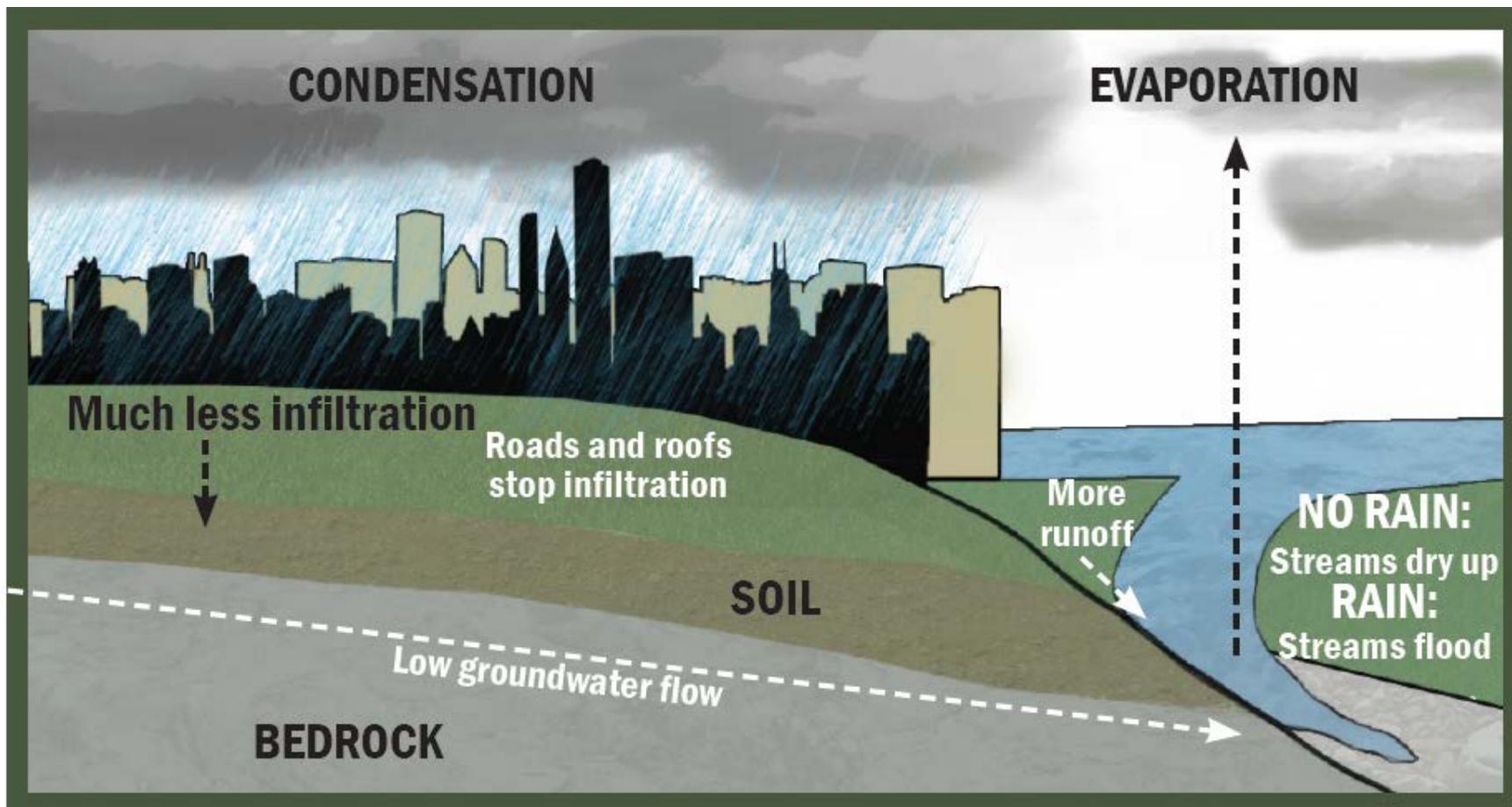
The Water Resources Program is one of many specialty programs under Rutgers Cooperative Extension.

*Our mission is to identify and address community water resources issues using sustainable and practical science-based solutions.*



Photos: Newark, NJ

# Urban Stormwater



*more development*



*more paved surfaces*



*more stormwater runoff*

# The Problems We Face

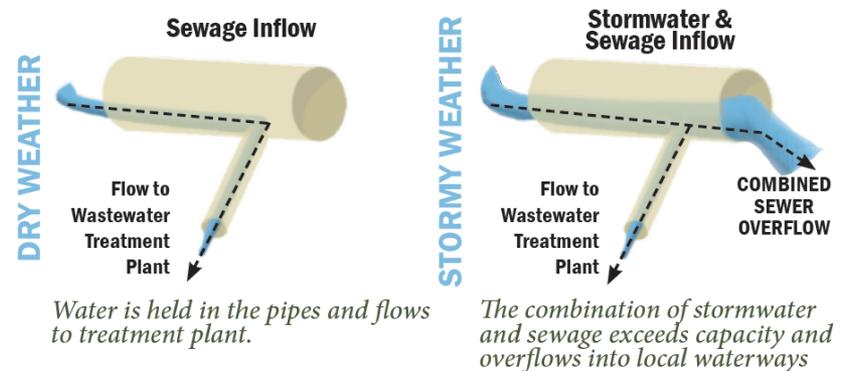


Photos: Newark, NJ

Photo Credit: Priscilla De Castro  
(Newark Photographer)

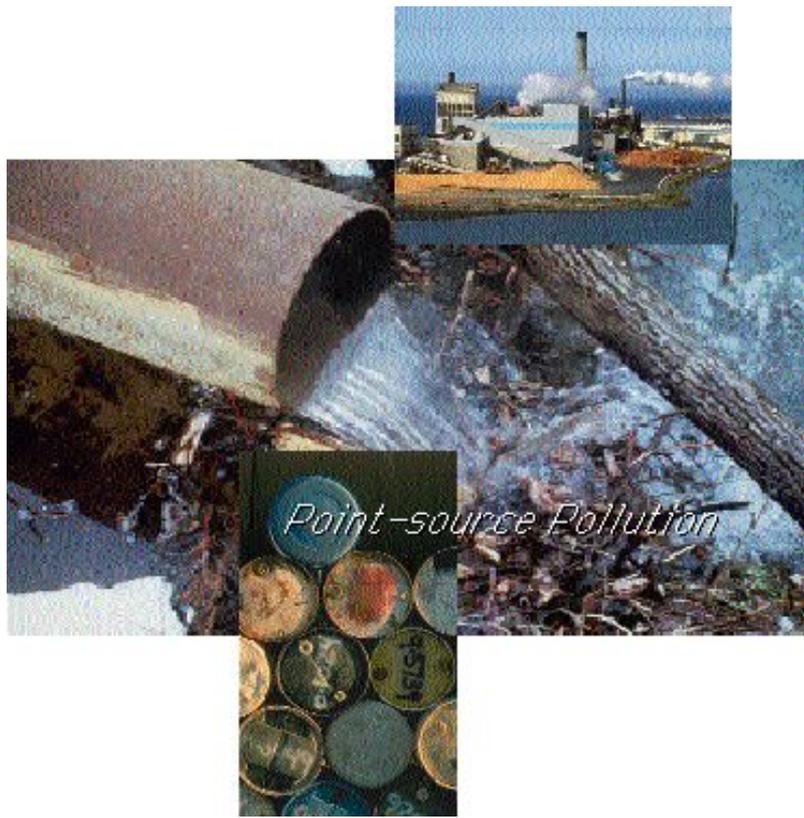
- Flooded parks, businesses & homes
- Sewage in streets, basements & streams
- Polluted water – don't eat the fish
- Old infrastructure
- No money, No jobs, No hope, and No help

## COMBINED SEWER OVERFLOWS



# Water Pollution Sources

## POINT SOURCE POLLUTION



## NONPOINT SOURCE POLLUTION



# Point Source Pollution

- Comes from a specific source, like a pipe
- Factories, industry, municipal treatment plants
- Can be monitored and controlled by a permit system (NPDES)



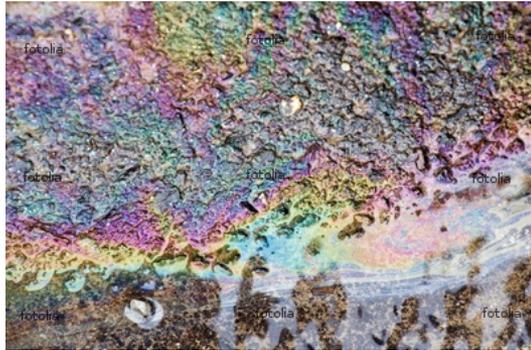
# Nonpoint Source Pollution

- Nonpoint Source (NPS) Pollution is pollution associated with stormwater or runoff
- NPS occurs when runoff collects pollutants on its way to a collection system or water body
- NPS pollution cannot be traced to a direct discharge point such as a wastewater treatment facility



# Examples of NPS

- Oil and grease from cars
- Fertilizers
- Animal waste
- Grass clippings
- Septic systems
- Sewage leaks
- Household cleaning products
- Litter
- Agriculture
- Sediment



# Impact of NPS

- Fish and wildlife
- Recreational water activities
- Commercial fishing
- Tourism
- Drinking water quality
- The Environmental Protection Agency considers nonpoint source pollution to be the greatest threat to water quality in the U.S. (EPA, 2007)



# Green Infrastructure is ...

...an approach to stormwater management that is cost-effective, sustainable, and environmentally friendly.

Green Infrastructure projects:

- capture,
- filter,
- absorb, and
- reuse

stormwater to maintain or mimic natural systems and treat runoff as a resource.



# Why Rainwater Harvesting?

Your actions are part of a bigger movement towards ***SUSTAINABLE LIVING:***

- **Water Conservation**
- Capturing Rainwater Runoff
- Reducing Water Pollution

# The Need for Water Conservation

While NJ is a “water-rich” state receiving over 40 inches of rainfall each year:

- New Jersey is also the most densely populated state in the country
- The average New Jersey resident uses **100** gallons of water per day
- Residents engaging in outdoor watering & irrigation increase their average water use up to **185** gallons per day in the summer months

# The Need for Water Conservation

- Saves money on utility bills
- Helps prevent water pollution and combined sewer overflows (CSOs)
- extends the life and reliability public and private infrastructure
- prevents or postpones the need to fund and build expanded public works systems



# How much water can you harvest from one rooftop?

Using a roof area of 800 ft<sup>2</sup> (40' x 20' )



Photo by: SharkeyinColo

1" rainfall event = 500 gallons

42" rainfall per year = 20,950 gallons

# Other ways to conserve water

## *Outdoor*

- Adjust watering as conditions change
- Native plants
- Mulch around plants
- Water early in the morning

## *Indoor*

- Look for EPA WaterSense logo
- WaterSense toilets (20% less water)
- Energy efficient dishwashers and washing machines (50% less water)
- WaterSense showerheads (40% less water)
- Faucet aerators



# Other ways you can help



**Plant Trees**



**Install Porous Pavers**



**Install Rain Gardens**

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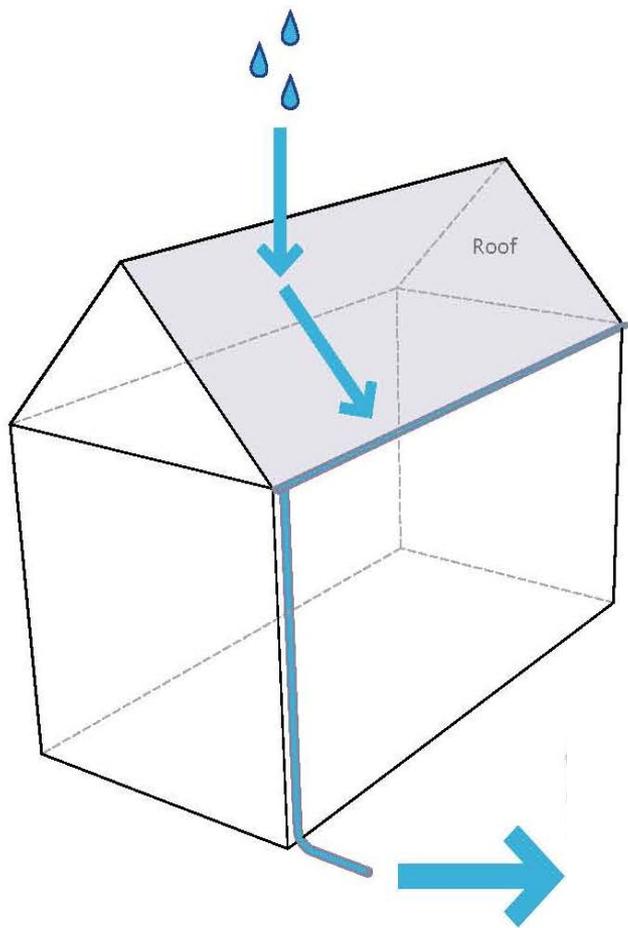
# Reduce Rain Water Runoff



# Reduce Rain Water Runoff



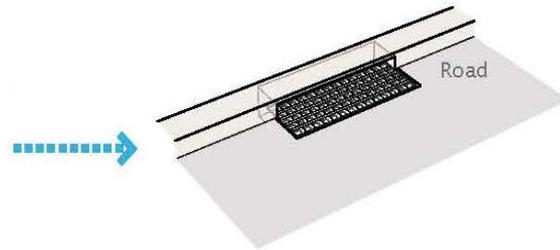
# Reduce Rainwater Runoff



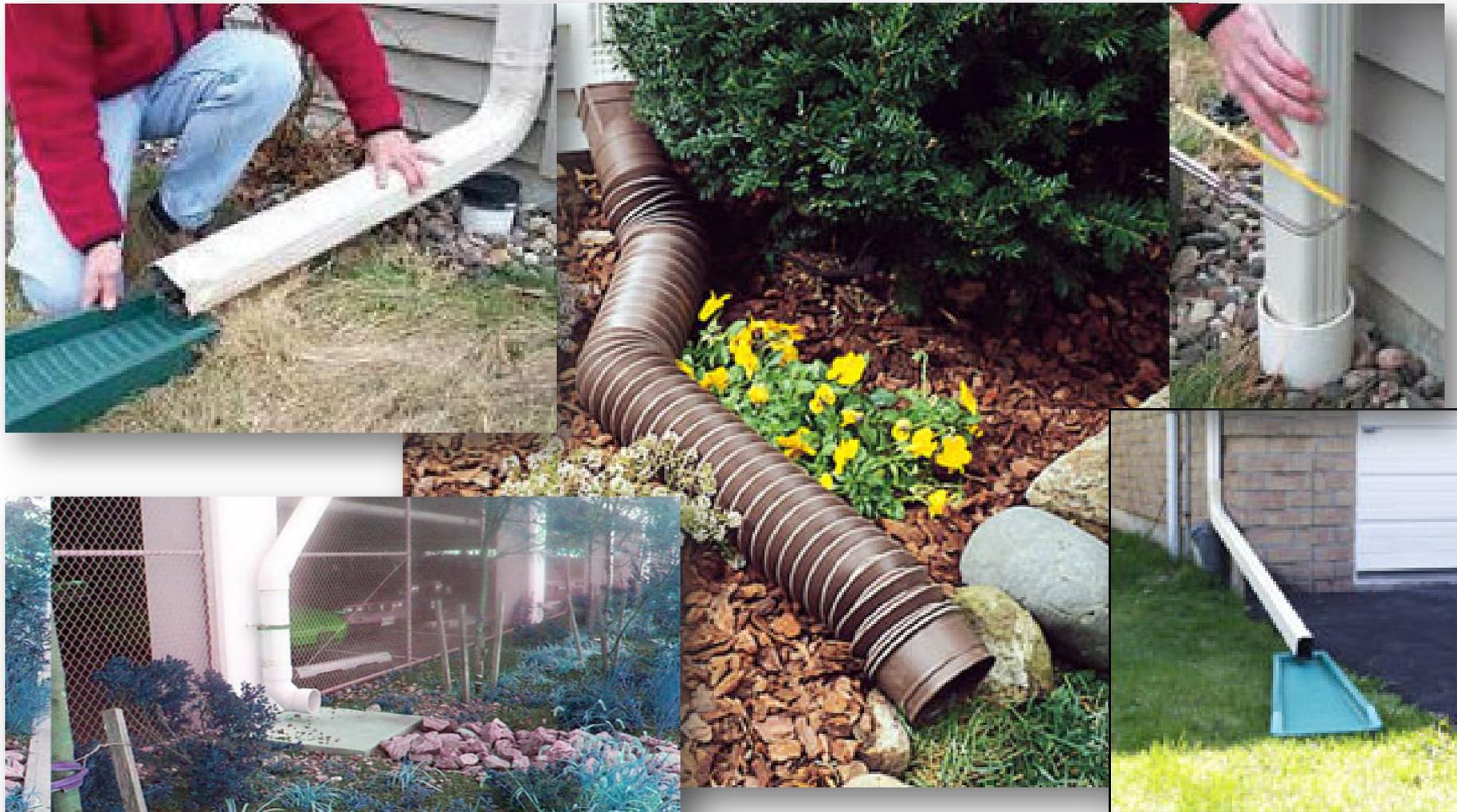
Disconnect your downspout by installing a rain barrel or a cistern



REDUCE THE AMOUNT OF RUNOFF ENTERING STORM SEWERS



# Downspout Disconnection/Redirection



# Why Rainwater Harvesting?

Your actions are part of a bigger movement towards *SUSTAINABLE LIVING:*

- Water Conservation
- Capturing Rainwater Runoff
- **Reducing Water Pollution**

# Reducing Water Pollution



**Nonpoint source (NPS) pollution**, or people pollution:  
dirt, litter, pesticides, fertilizers, oil and grease, pathogens

# Rainwater Harvesting Benefits

- Your plants will love it!
- No salts or chemicals, slightly acidic pH



# Rainwater Harvesting Benefits

- Protect valuable landscape plants during times of drought.



**No Rainwater Harvesting System**



**With Rainwater Harvesting System**

# Congratulations on Your Cistern Installation!

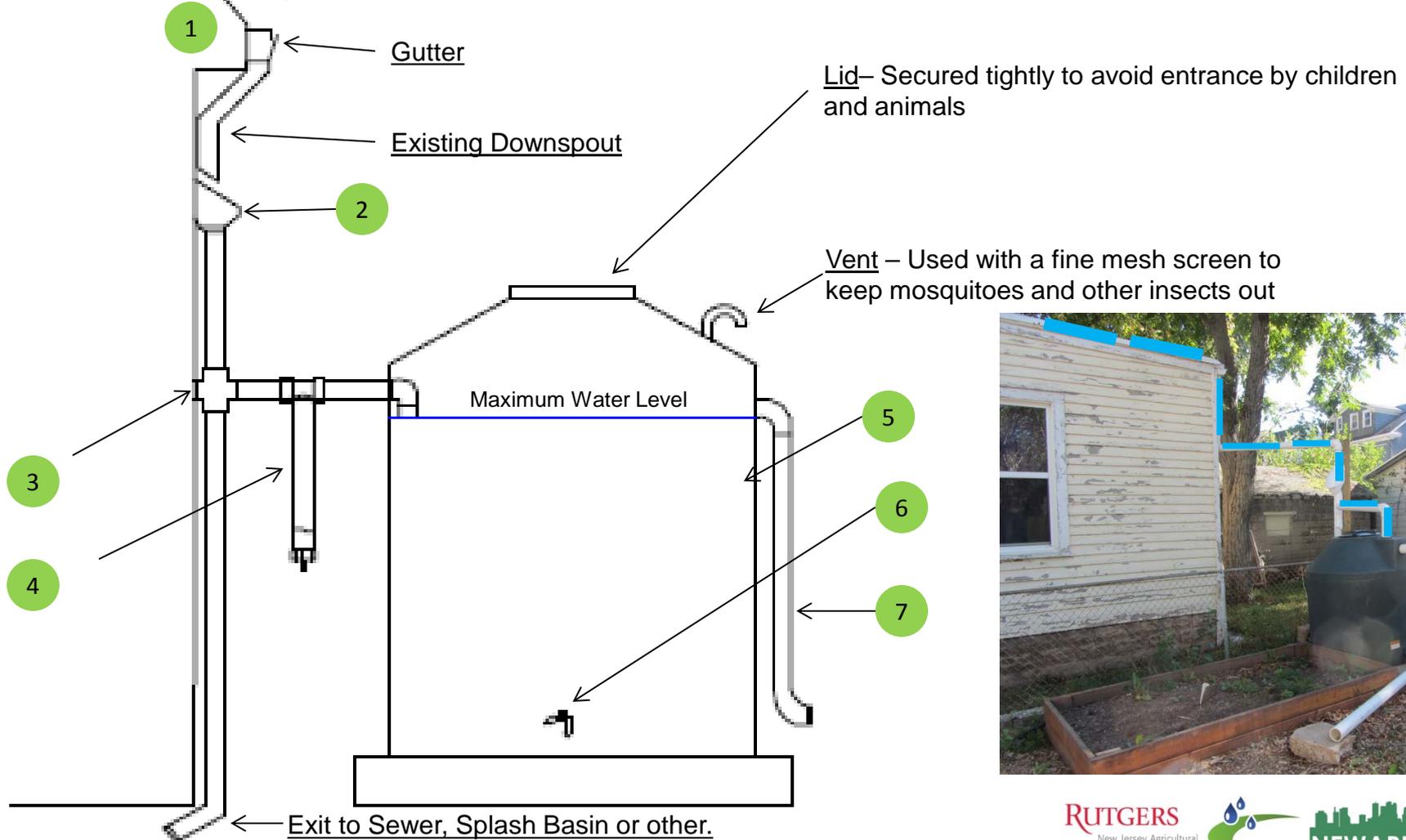
**Welcome to the wonderful world of rainwater harvesting!**

- Rainwater harvested from your cistern can be used for:
  - watering gardens,
  - flushing toilets,
  - washing cars,
  - and plenty of other non-potable uses.



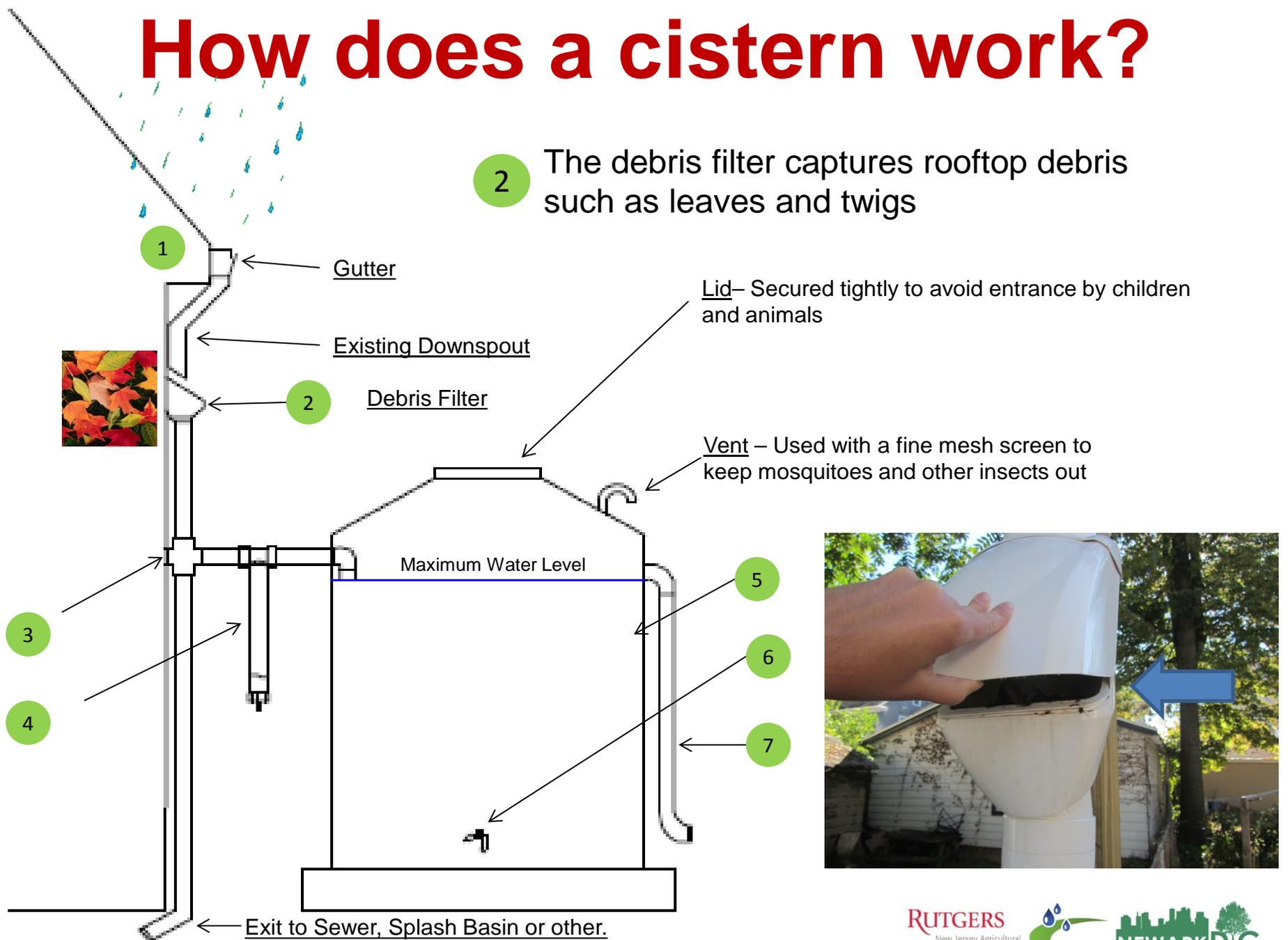
# How does a cistern work?

1 Rainwater falls on the roof and flows into the gutter and existing downspout

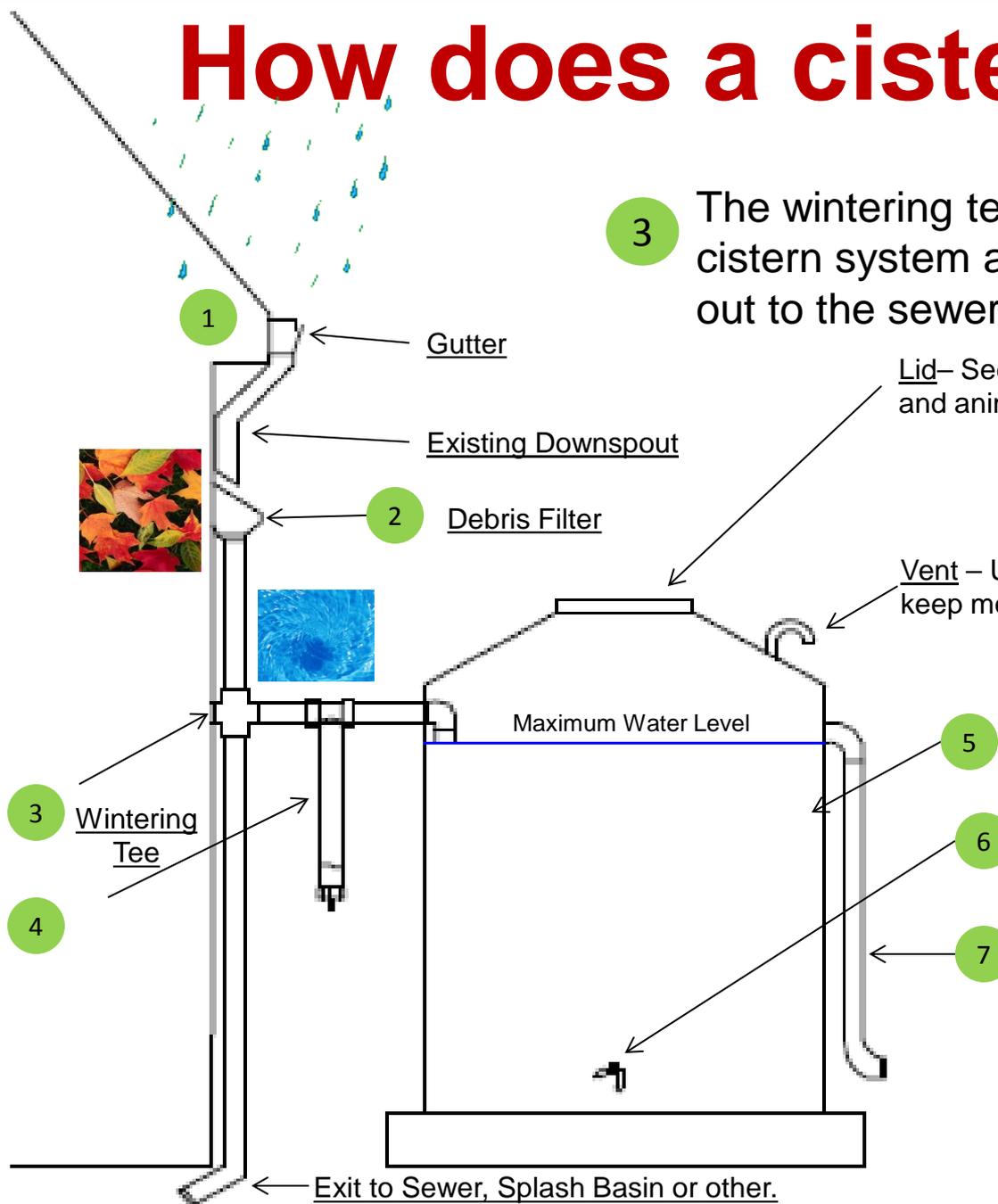


# How does a cistern work?

2 The debris filter captures rooftop debris such as leaves and twigs



# How does a cistern work?



3

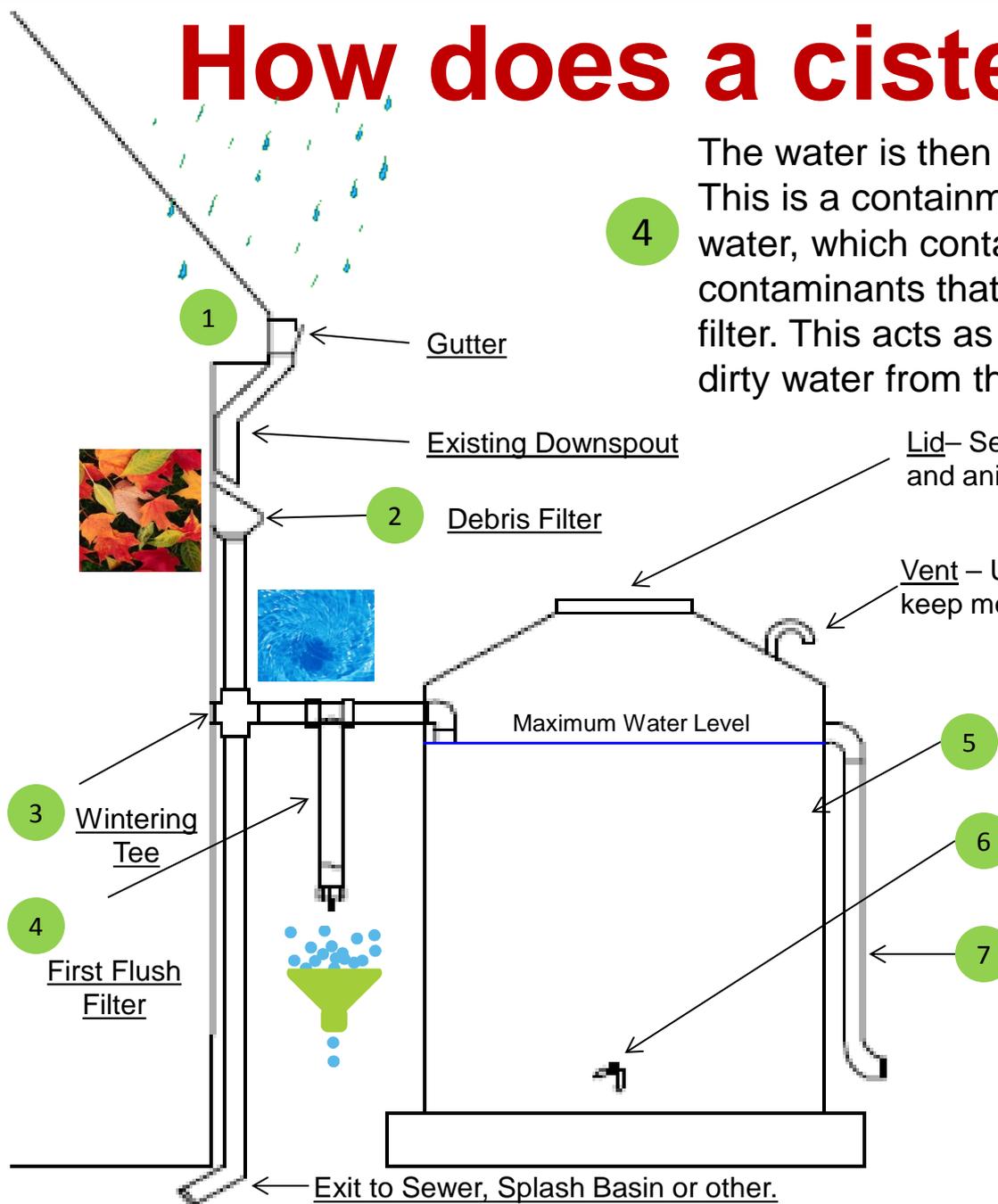
The wintering tee diverts the water into the cistern system and keeps it from continuing out to the sewer, splash basin or street.

Lid– Secured tightly to avoid entrance by children and animals

Vent – Used with a fine mesh screen to keep mosquitoes and other insects out



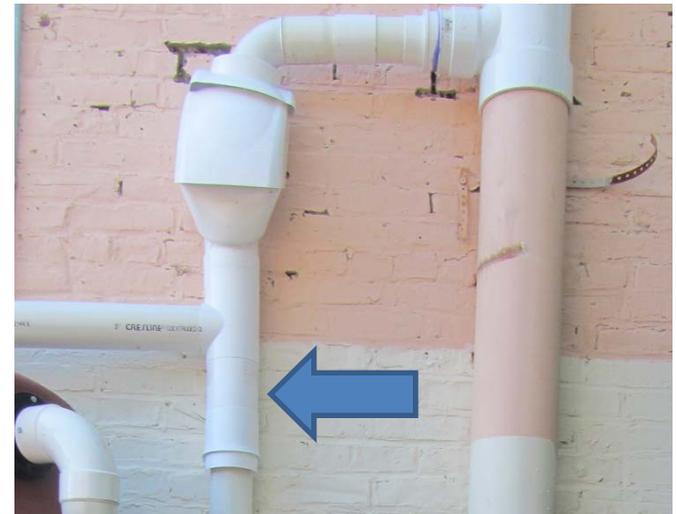
# How does a cistern work?



The water is then directed into the first flush filter. This is a containment area for the first few gallons of water, which contain rooftop debris and contaminants that were not captured by the debris filter. This acts as a filtering system by separating the dirty water from the cleaner water.

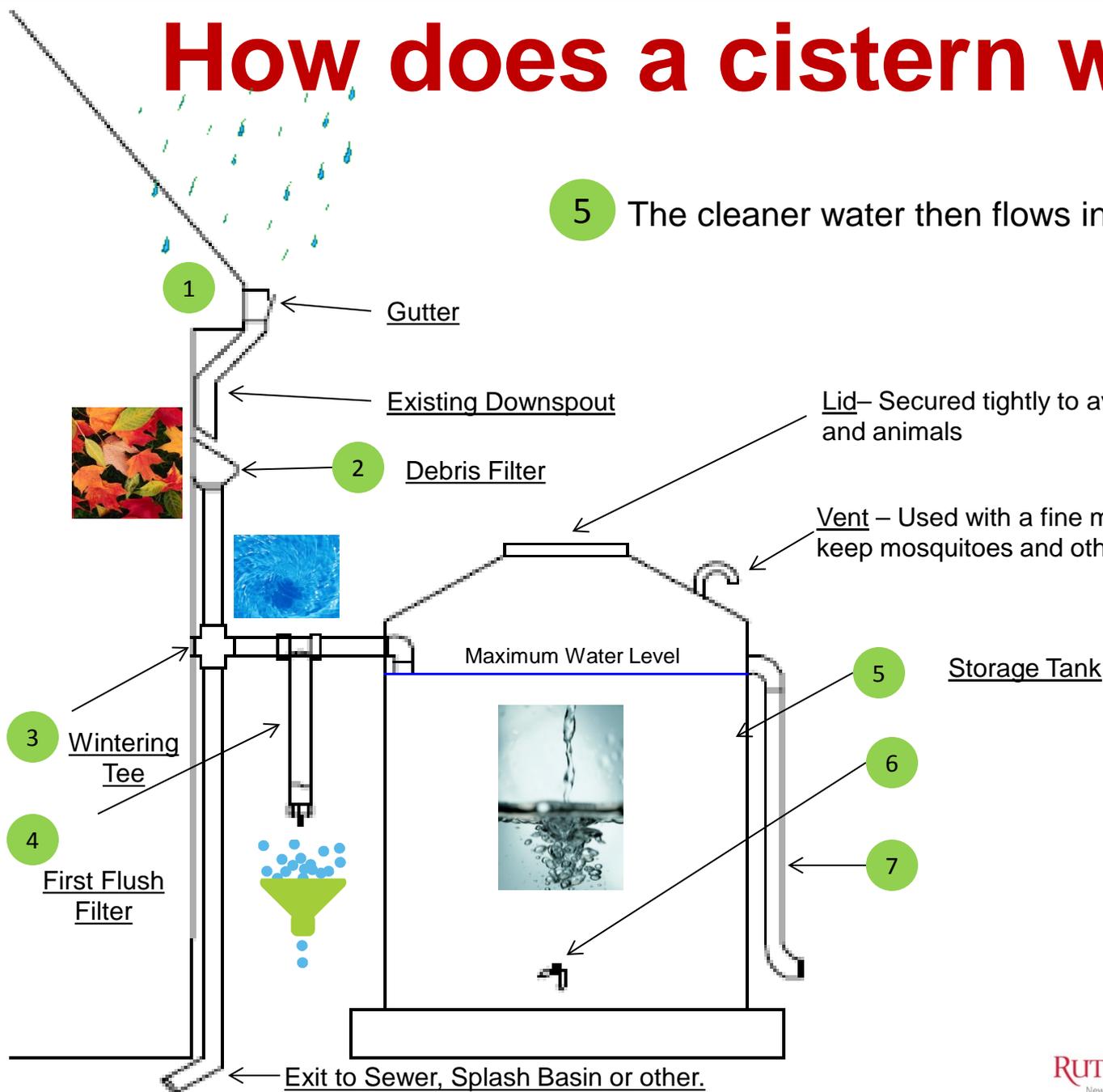
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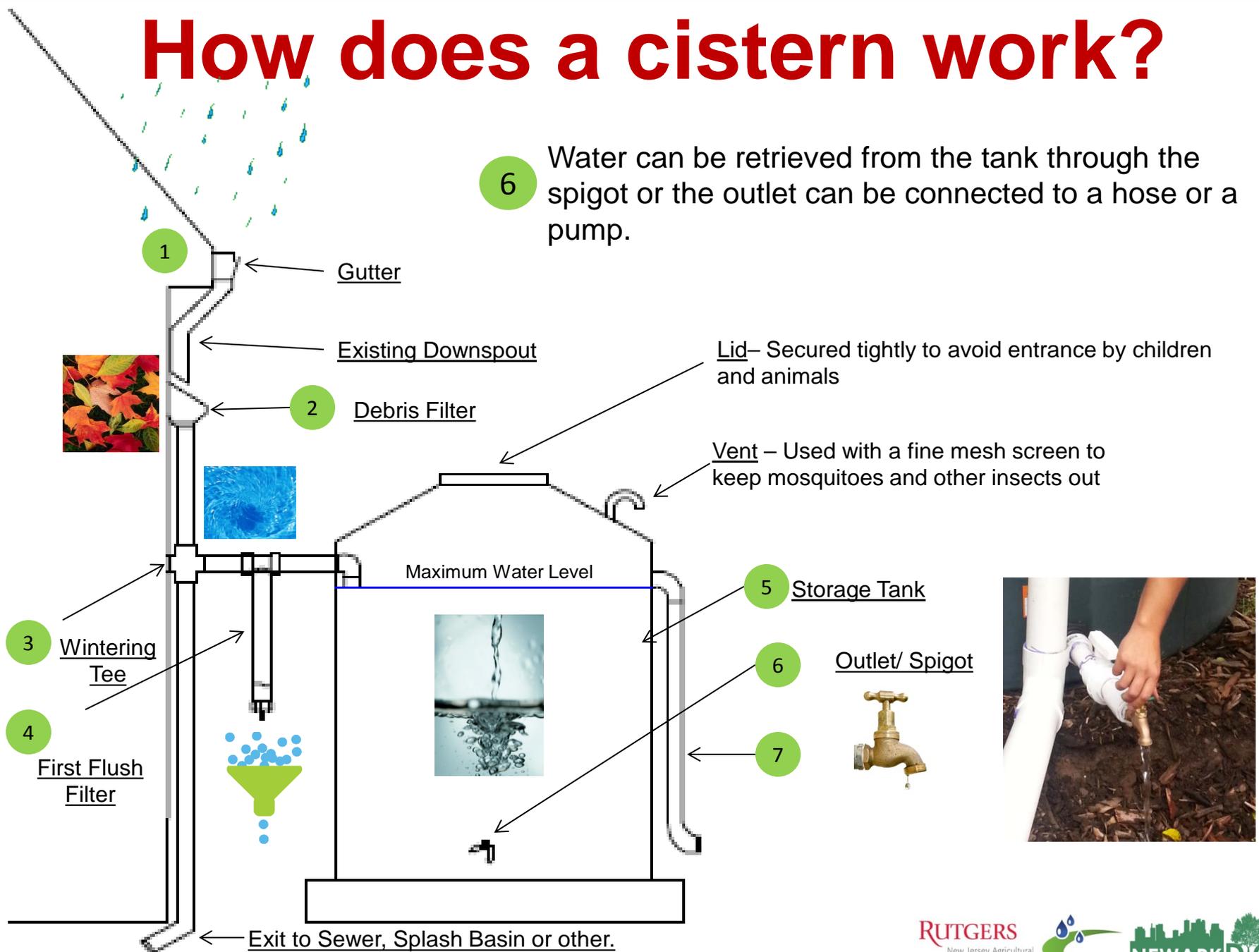
# How does a cistern work?

5 The cleaner water then flows into the storage tank.

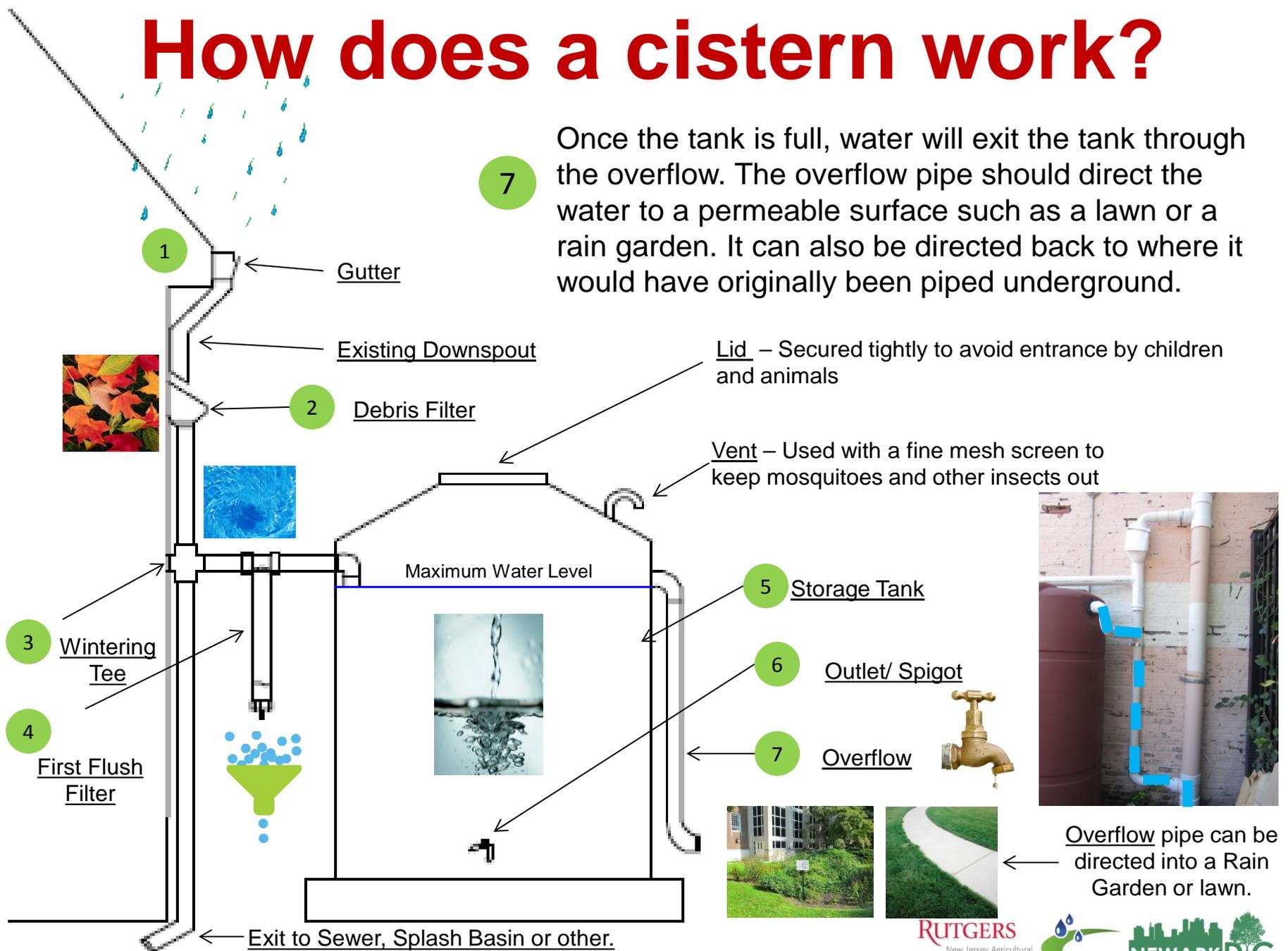


# How does a cistern work?

6 Water can be retrieved from the tank through the spigot or the outlet can be connected to a hose or a pump.



# How does a cistern work?



# Rainwater Harvesting Systems

- Do **not** drink or cook with the water collected from the cistern.
- A warning sticker or sign should be placed on the tank to avoid the possibility of anyone mistakenly drinking the water.



# Rainwater Harvesting Systems and NPS

- By collecting rainwater, you are preventing NPS from occurring and bringing pollutants into a collection system or water body
- NPS include:
  - Oil and grease from cars
  - Fertilizers
  - Animal waste
  - Grass clippings
  - Household cleaning products
  - Litter
  - Sediment



# Weekly Inspections and Maintenance

- Check for leaks, clogs and other obstructions
- Check for holes and vent openings where animals, insects and rodents may enter
- Repair leaks with sealant
- Remove debris from filter



# Monthly/Quarterly Inspection and Maintenance



- Check roof and roof catchments to make sure no particulate matter or other parts of the roof are entering the gutter and downspout directed into the cistern
- Keep the roof, gutters and leader inlets clear of debris

# Monthly/Quarterly Inspection and Maintenance

- Inspect cistern cover, screen, overflow pipe, sediment trap and other accessories
- Filter media from sand and gravel cistern filters must be cleaned to prevent clogging by partially removing the top layer of filter media and replacing it with a new one
- Flush the cistern to remove sediment



# Winterizing your Cistern

- Winterizing in the Fall season is **CRUCIAL!**



# Winterizing your Cistern

- Close the valve to disconnect water from the system and re-route back to the downspout
  - Value will close when the button is pulled open as displayed to the right
- ***If water freezes in the system it will break!***



# Winterizing your Cistern



- Drain **ALL** of the water out of the **ENTIRE** system including the storage tank, roof washer, pipes etc.
- Open the main valve of storage tank and open the valve on roof washer
  - Drain from the spigot or if the spigot is raised, you will need to uncap the lower screw top to drain

# Winterizing your Cistern

- Don't forget to close the valve of storage tank



# Rebooting In the *Spring*



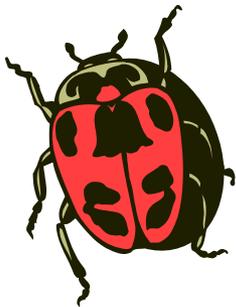
- Re-direct roof water from the drain pipe back into tank storage system
- Re-open the valves
- Clean any winter debris from gutters, leader inlets and roof
- Repair any and all leaks
- Thoroughly clean the tank





## Problem:

Insects, spiders, rodents, reptiles, and birds can crawl or fall into the water along with their waste products.



## How to Avoid It:

All cistern openings should have a screen cover, and all vents should terminate in a downward position to prevent rodents, insects, and other things from entering.





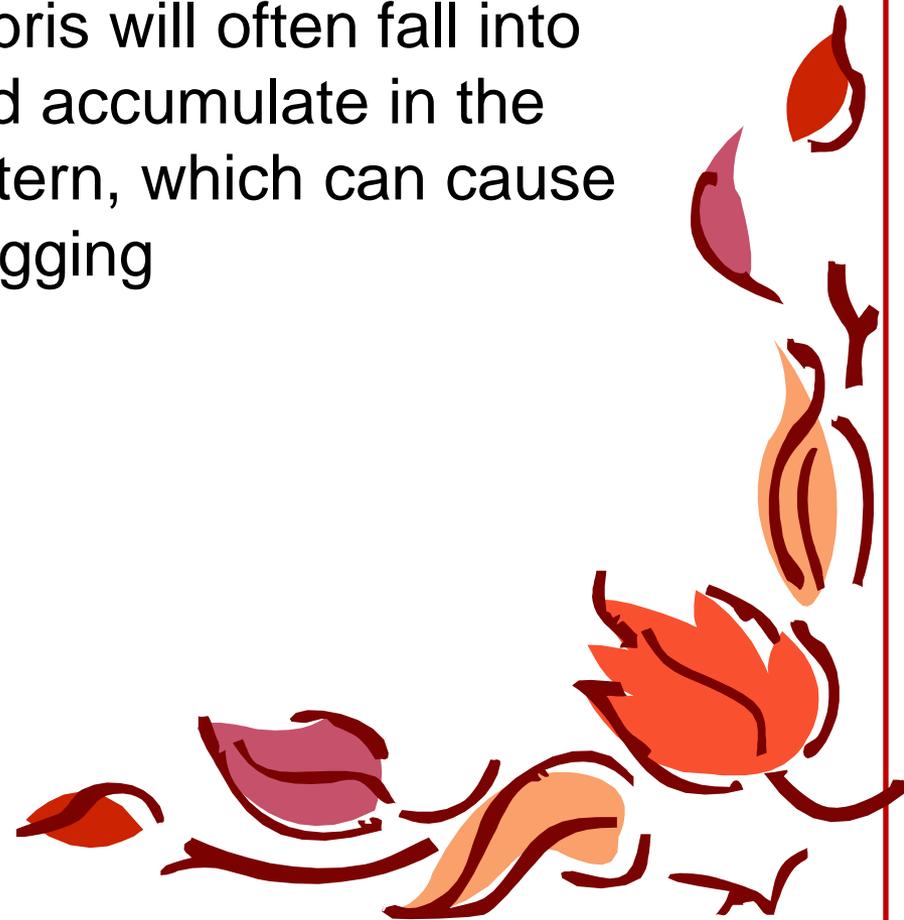
## Problem:

Sediment, twigs and debris will often fall into and accumulate in the cistern, which can cause clogging

## How to Avoid It:

Cisterns should be properly sealed, water tight and located away from trees if possible.

Be sure to clean gutters as needed to reduce debris buildup.



# Credits

- This program was funded by the NJ Department of Environmental Protection 319(h) grant program in the Green Infrastructure for the City of Newark project.





# Questions?

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