

Water Availability and Water Reuse:
A new approach for Water Resources
Management

1

Introduction of Water Reuse Systems impacts
Water Resources Management

2

Water Availability

3

Case – Study in Brazil

1

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Case Study in Brazil

Current Water Resources Management

Designed to attend the human demand

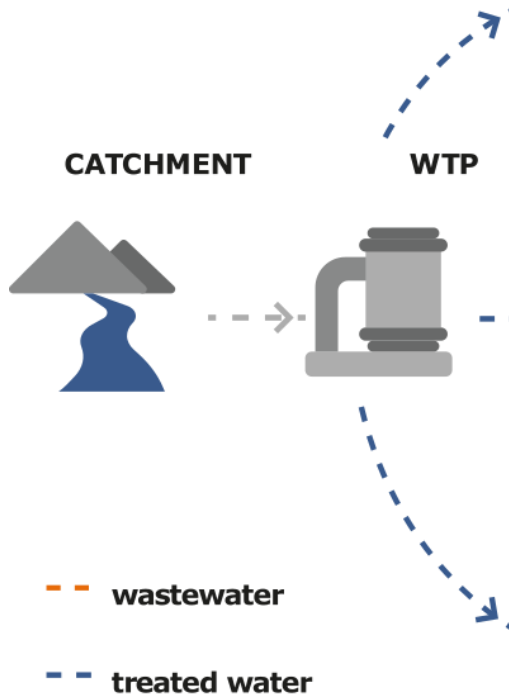
CATCHMENT



- - wastewater

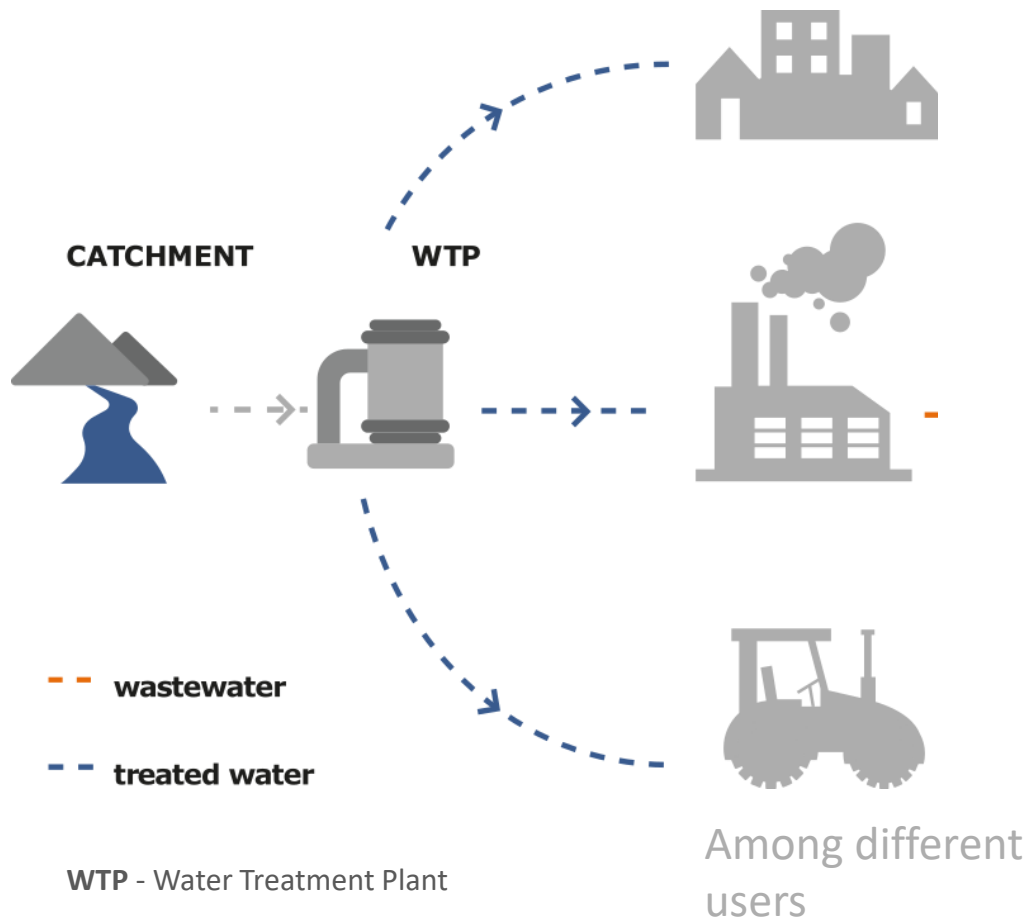
- - treated water

Current Water Resources Management

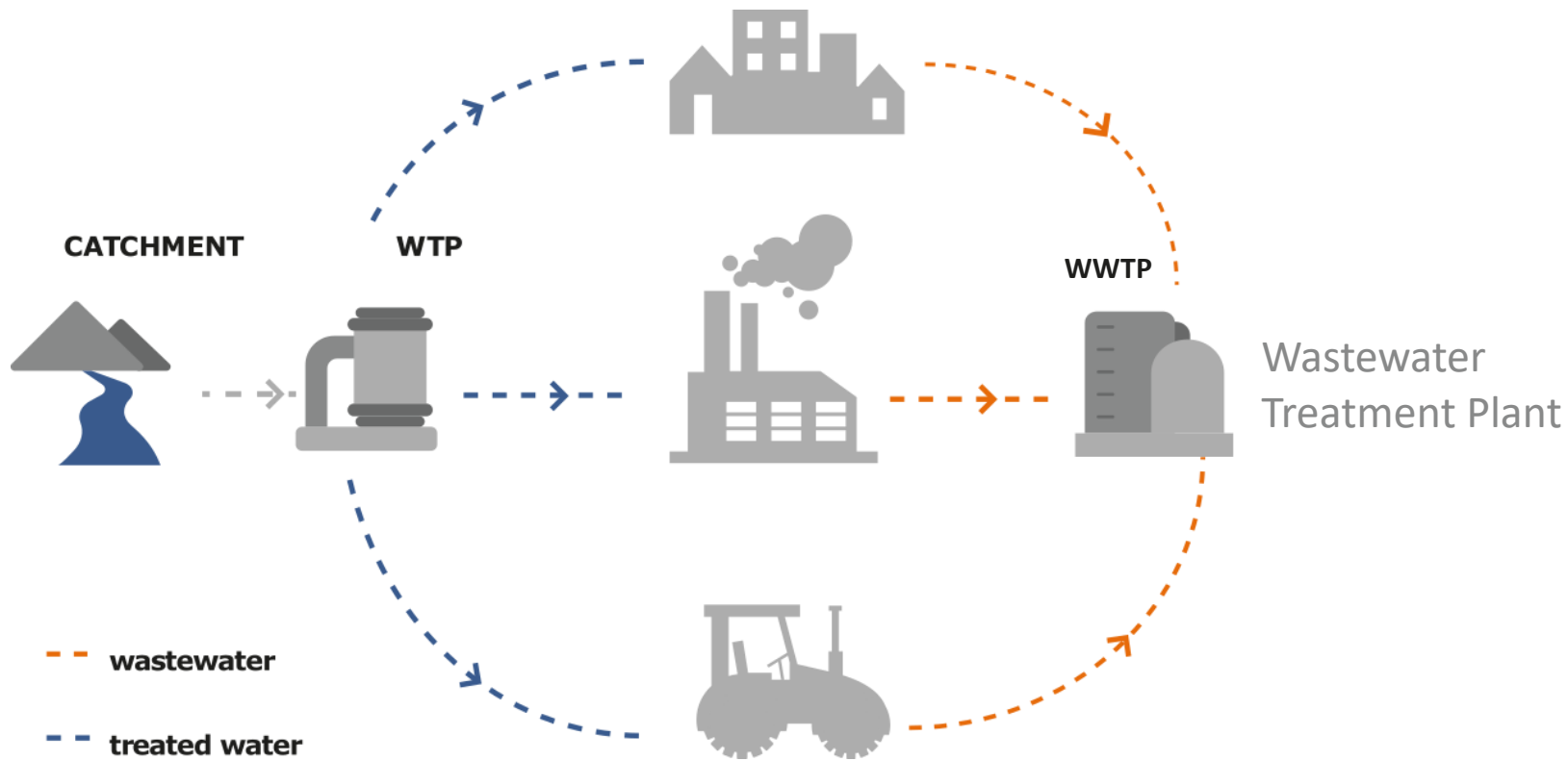


WTP - Water Treatment/Purification Plant

Current Water Resources Management



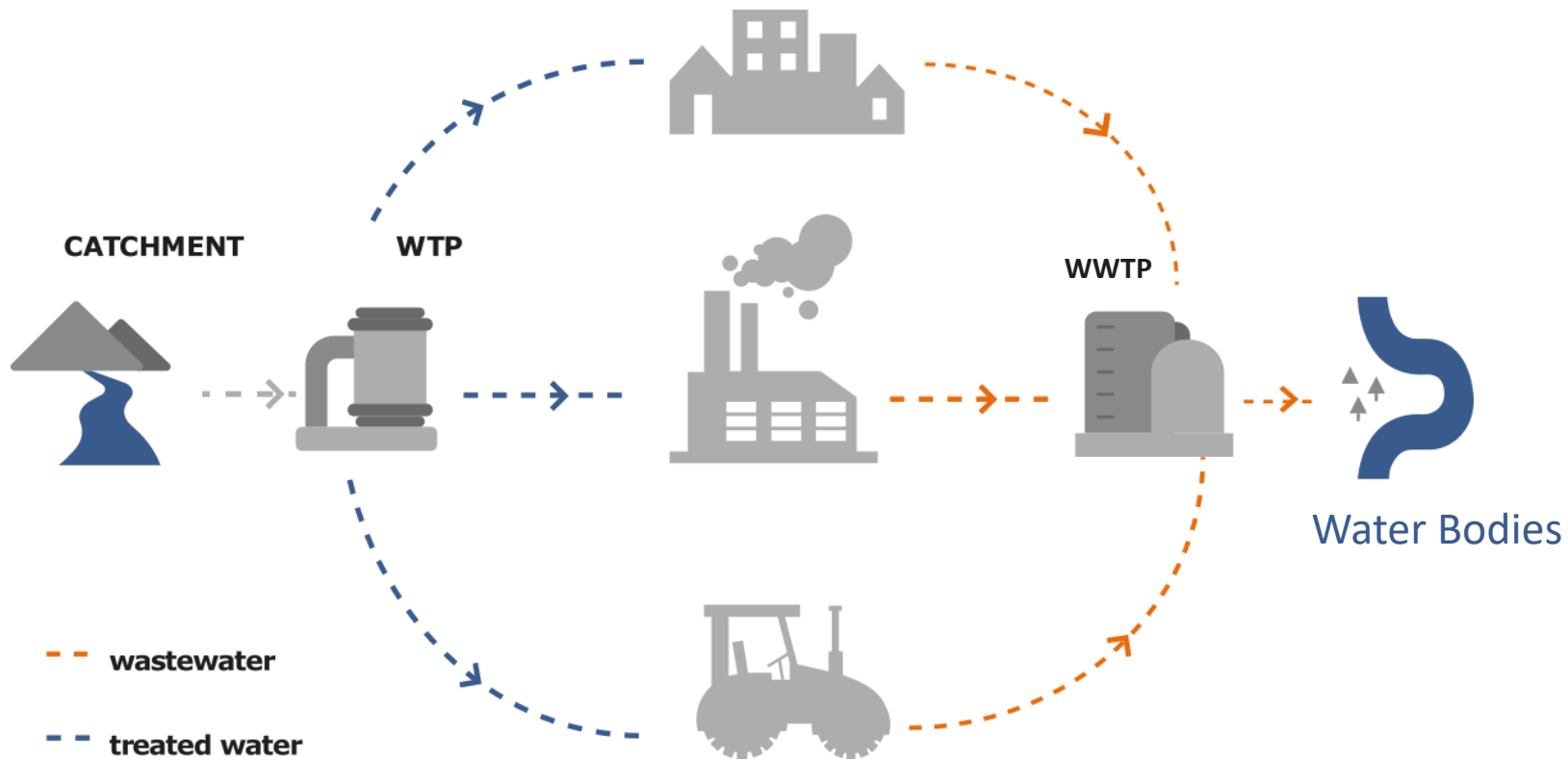
Current Water Resources Management



WTP - Water Treatment Plant

WWTP - Wastewater Treatment Plant

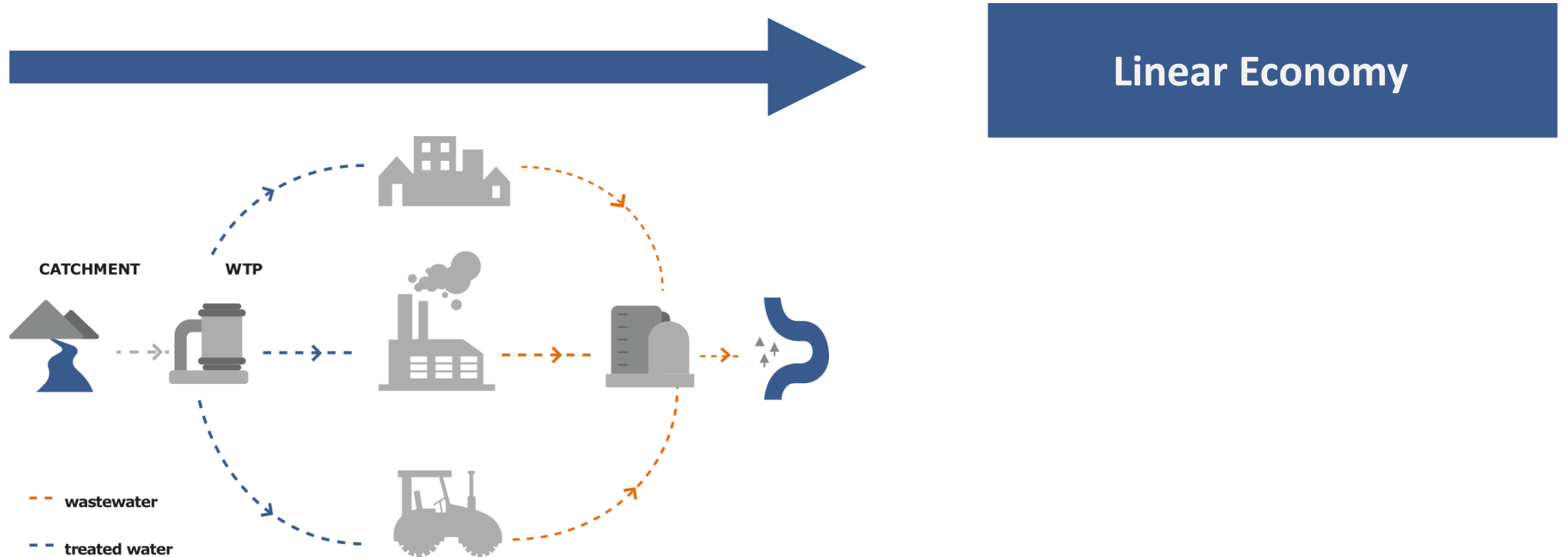
Current Water Resources Management



WTP - Water Treatment Plant

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Current Water Resources Management



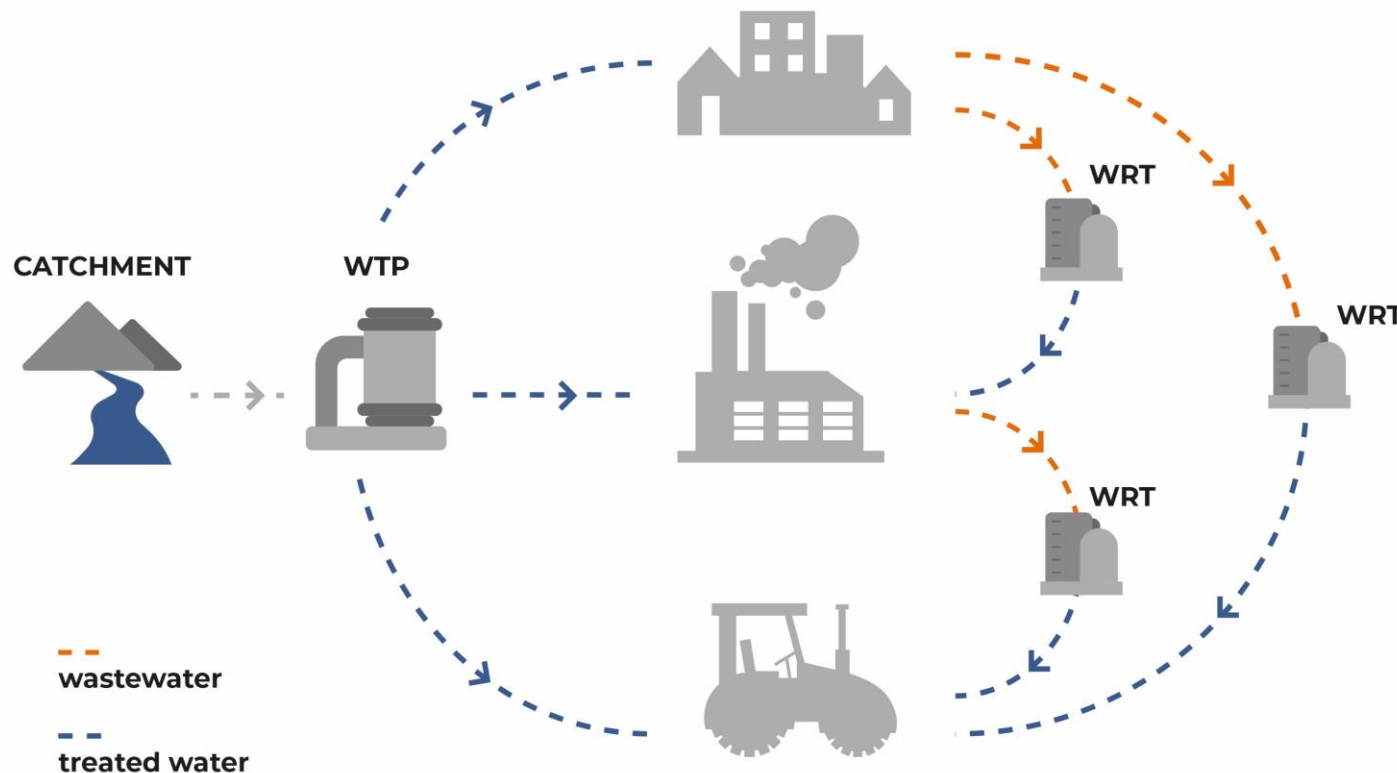
WTP - Water Treatment Plant

WWTP - Wastewater Treatment Plant

Water Resources Management with Water Reuse

Diversity of "water pathways"

Treated household wastewater reuse by Factories or Agriculture



WTP - Water Treatment Plant

WRT - Water Reuse Treatment

Circular Economy

Water Resources Management with Water Reuse

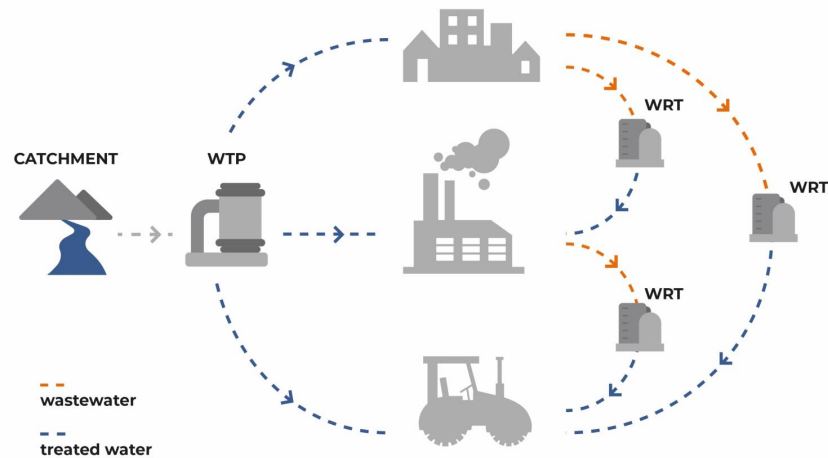
Impacts

Water Availability on Rivers

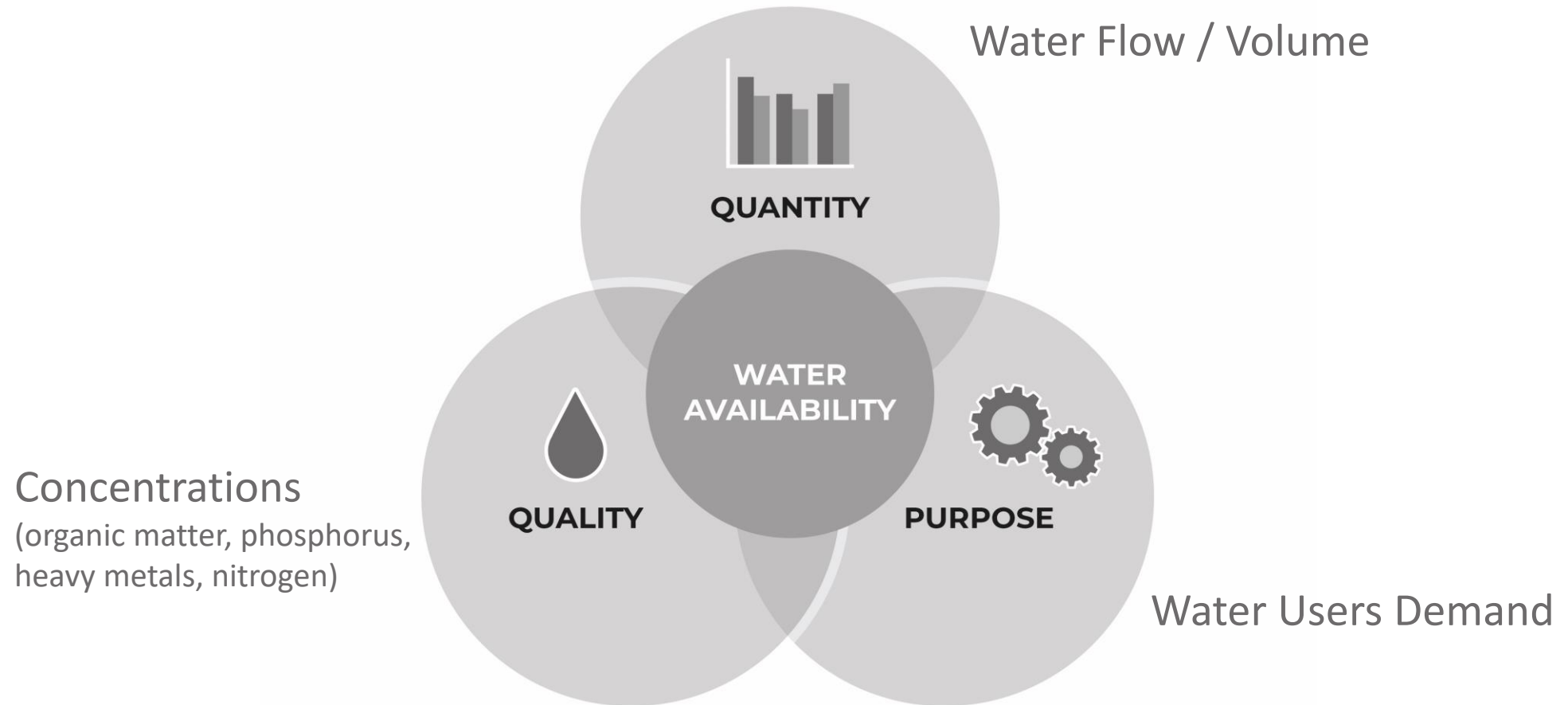
- Decrease of water withdrawal -> Quantity
- Decrease of treated wastewater discharge into rivers -> Water Quality

Water Users

- Increase of water availability to other users -> Quantity and Quality



Water Availability



Case Study: Iguazu River - Brazil



Water Resources in Brazil

Has the **largest freshwater supply in the world**, with 12 percent of the entire planet's total volume

Faced a **water crisis** between 2012 and 2016 - São Paulo

- increased water demand,
 - poor water quality of local rivers
 - shortage of rainfall
-
- **Lack of directives concerning water reuse and integrated Water Resources Management**
 - São Paulo has a Water Reuse System in the industrial pole

Aquapolo – Water Reuse System in São Paulo



Treated household wastewater is reused by the industrial pole. 1000 L/s

Iguazu River

- Currently there is an **Atypical Drought** Period in South Brazil due to rainfall shortage
- Poor Water Quality - measured BOD concentration ranging from 25 to 65 mg/L in Curitiba region
- Industrial pole is expanding and the water demand will also increase

Iguazu River

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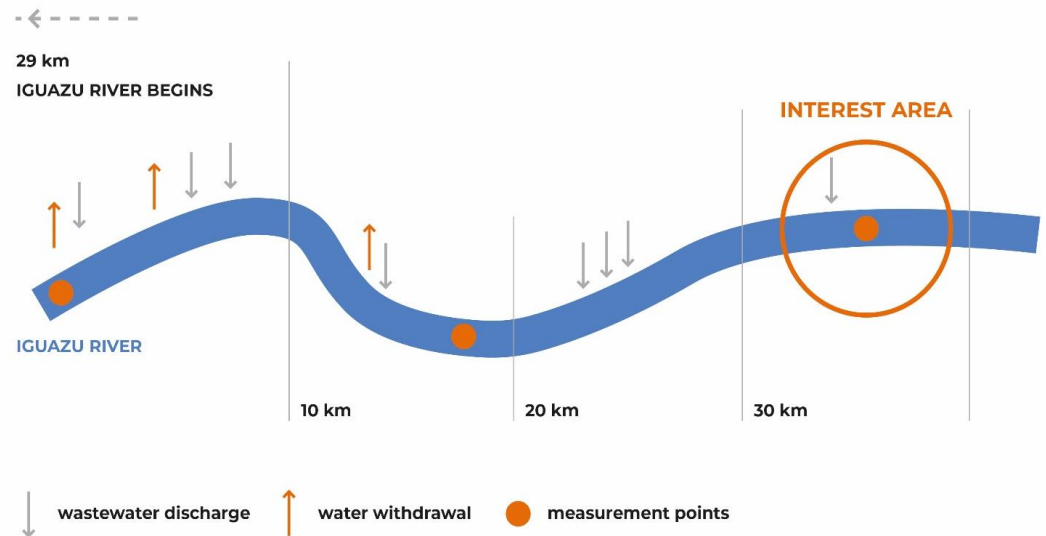
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Other users along the river affect rivers Water Availability

- Water Withdrawn
- Wastewater Discharge

Indirect Water Reuse

In Iguazu River there is already an indirect water reuse process in which concentrations of organic matter from released effluents upstream **have not been fully assimilated until the next user**



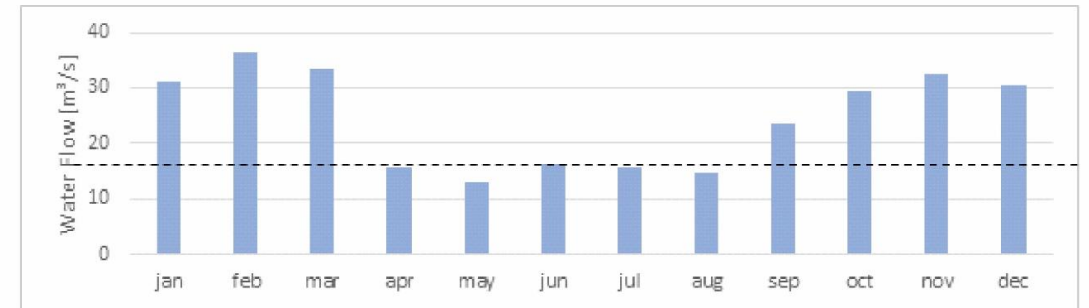
River Seasonal Water Availability

- Rain Seasons
- Water Quality Variability
- Less water, Less dilution

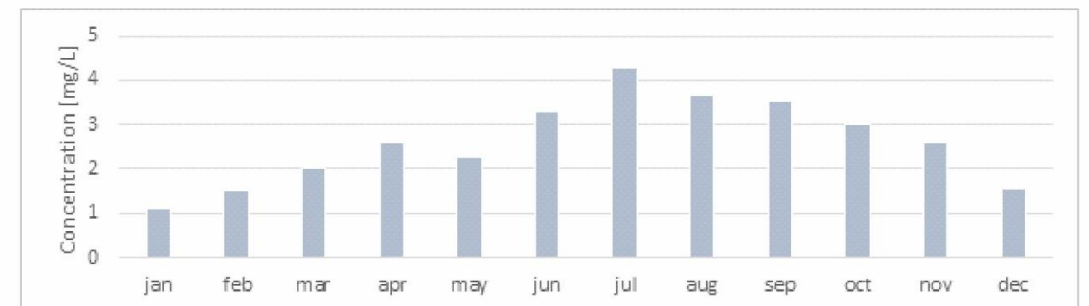
RIVER WATER AVAILABILITY

(Below charts show the monthly values with 95% frequency)

WATER FLOW



BOD concentrations from upstream users discharges



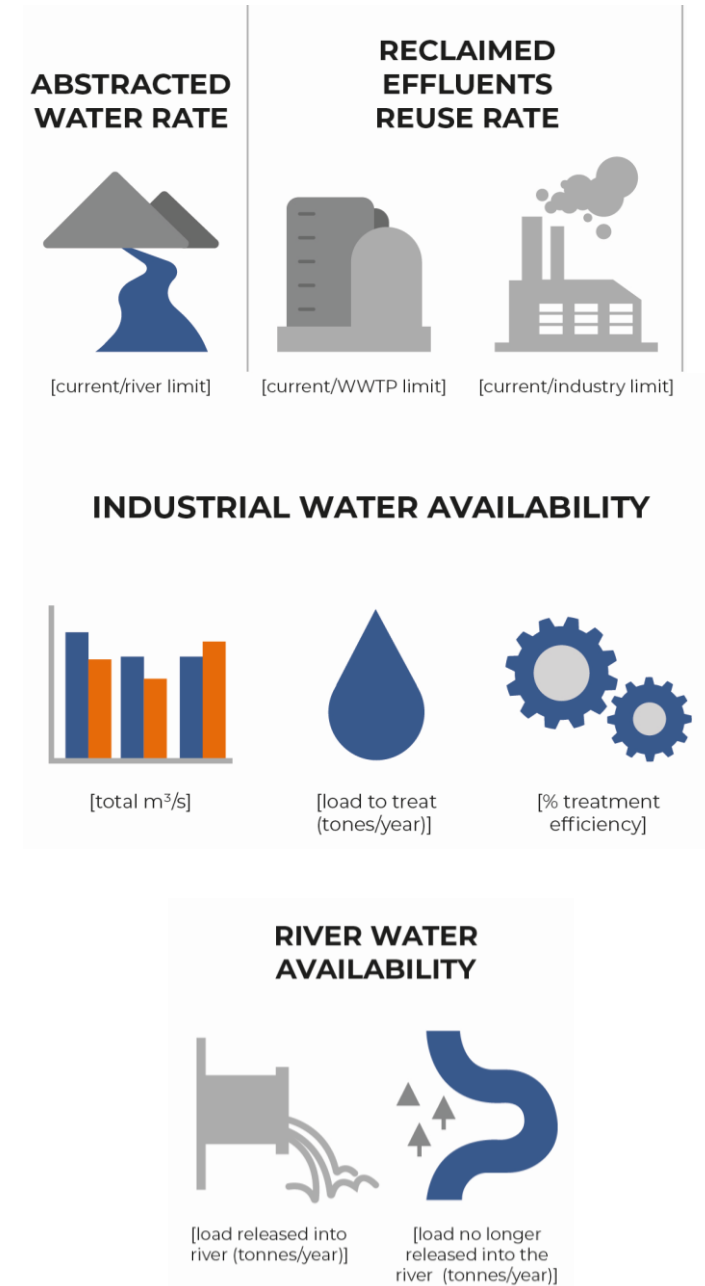
Solutions for the development region where demand for water is increasing

- Abstracted Water Rate,
- **Water Reuse** from WWTP and from Factories

Reduce the load released into river

Water reuse system from treated wastewater and the Factories internal water recycling might reduce the load of 567 tons/year of organic matter into Iguazu River

This also allows the **other downstream users to have a better water quality**



Final Recommendations

Reduce First

Reducing should always be the first option. Water losses in:

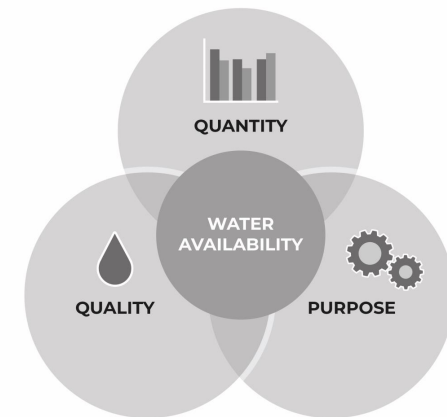
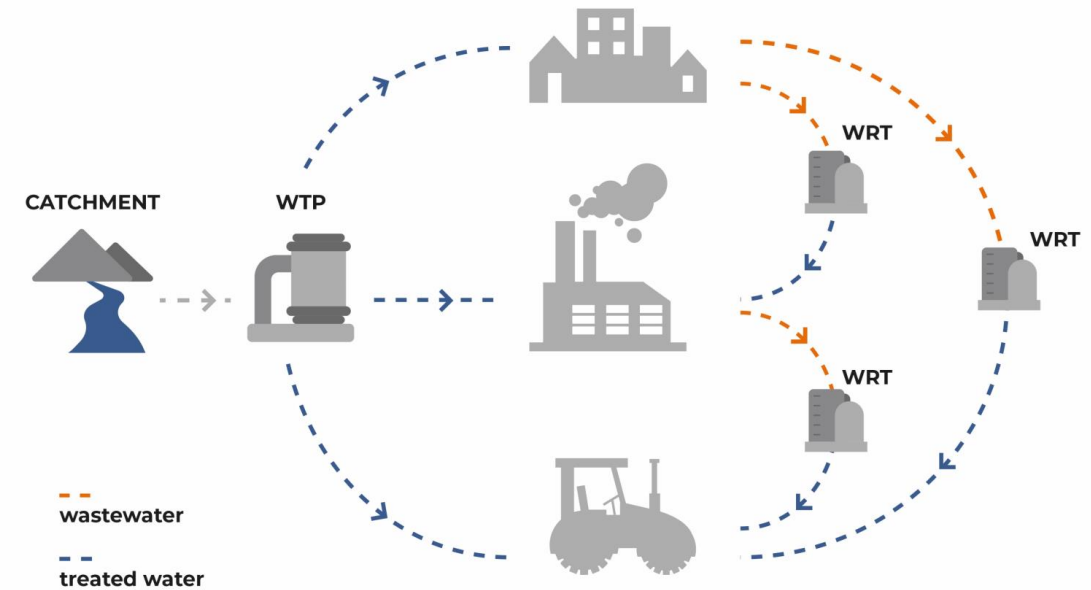
- Water distribution
- Factory processes

Water availability analysis is fundamental


...for transforming water resources management into an integrated and circular economy model.

There are several pathways that water may follow among users with water reuse systems.

The determination of the best economic and environmental efficiency should be made based on the analysis of **water availability that includes the quantity, quality and purpose of water.**





Elisa Stefan,
MSc. Water Resources Engineering at University Federal do Parana
 elisasstefan@gmail.com