T.C. Ministry of Forestry and Agriculture

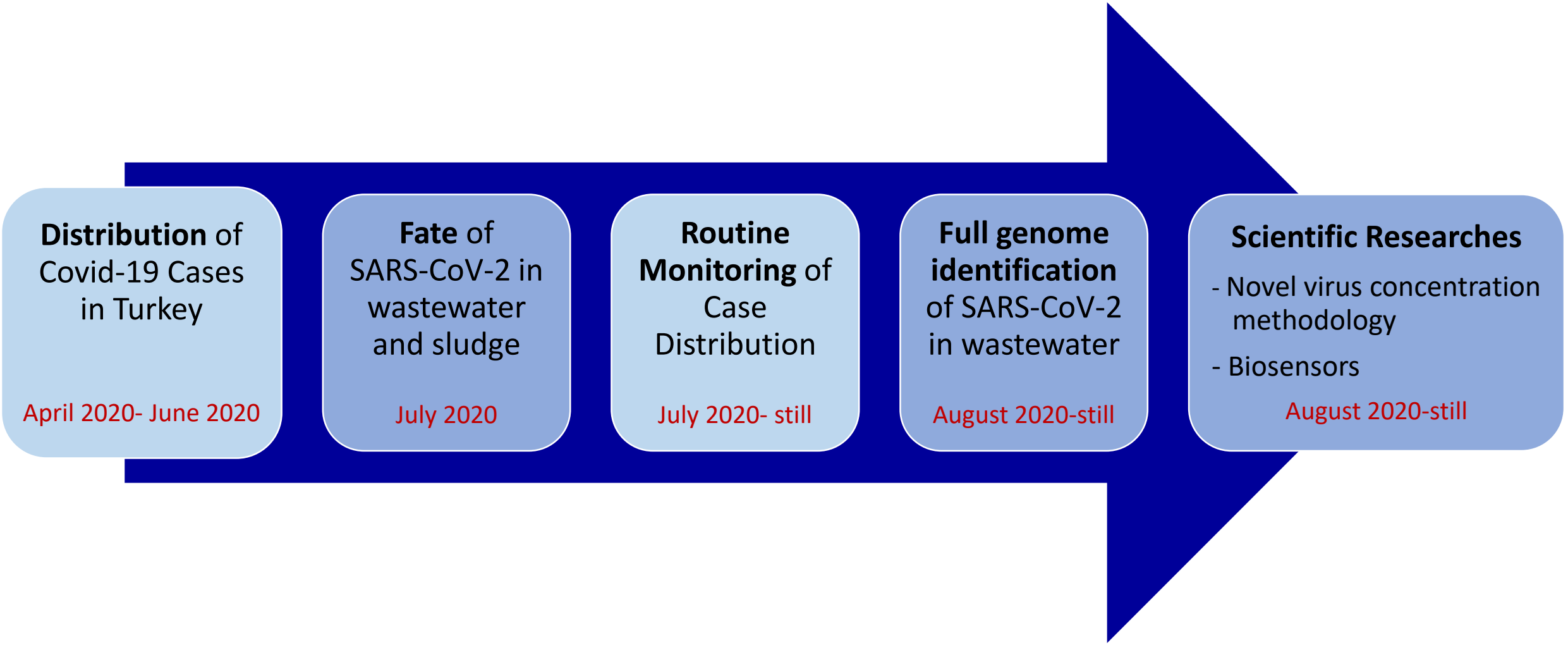
Turkish Water Institute

Assoc.Prof.
Bilge Alpaslan Kocamemi
Scientific Advisor
Principal Investigator

Marmara University
Environmental Engineering
Department
Istanbul, Turkey

SARS-CoV-2 Surveillance Study for Wastewater & Sludges in Turkey

Steps of the Surveillance Study



Logistics of the Surveilance Study in Turkey

- Coordination -Government-
- Principal Investigation -University-
- Scientific Advisory -University-
- Sampling -Municipalities& Private Contractors -
- Transportation -Government& Private Contractors -
- Lab Analysis Government& Private Companies
- Data Analysis- -University-
- Data Announcement -Private Companies-

PROJECT TEAM

Project Owner

REPUBLIC OF TURKEY MINISTRY OF AGRICULTURE AND FORESTRY

TURKISH WATER INSTITUTE SUEN TÜRKİYE SU ENSTİTÜSÜ

Coordination

Scientific Advisory Investigation Data Analysis

WWTPs -Municipalities

Instructions

Department of Environmental Engineering

Sample Collection

Instructions

Lab Analyses

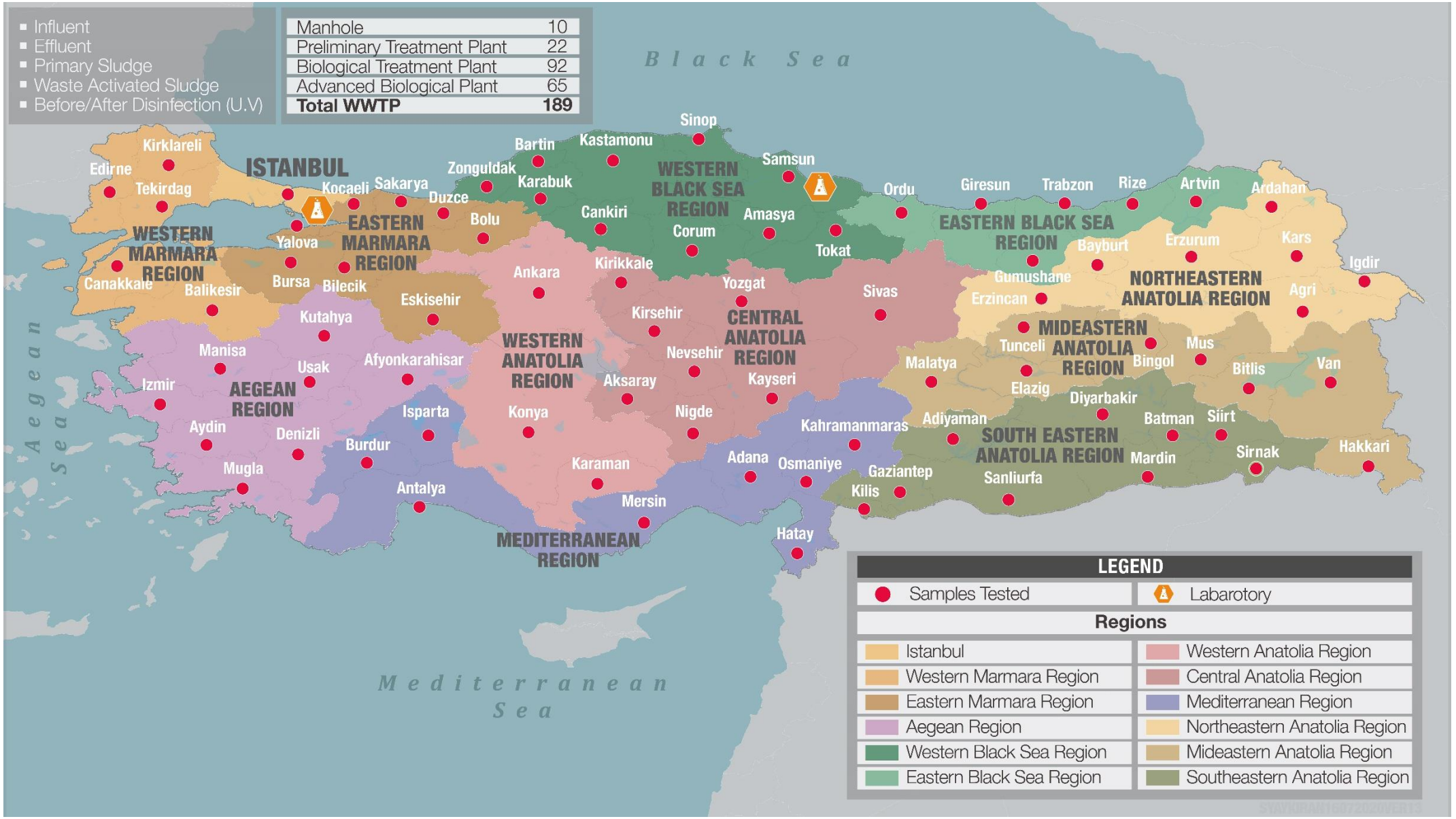
State Hydraulic Works

Transportation of Samples

Veterinary Control Research Institutes

Scientific Advisory: Health Sciences University

SAMPLE COLLECTION (81 cities in Turkey)



Sample Collection

- **2 X 250 ml samples were collected in sterile plastic bottles**

  Influent – Effluent : mostly 24 hrs composite samples , Sludge : grab samples

Data Gathering

- **Data forms**

  General information about STP

  Population/Area served, Flowrate, Treatment Units, Effluent discharge, Sludge Disposal

  Environmental and Operational conditions

  Rain condition, Hydraulic Retention Time, Sludge Age

  Influent characteristics of influent

  Actual Flowrate, Wastewater Temperature, BOD, COD, TKN, Tot-P, SS

Transportation

- **Cold chain (4^0C) transportation to *Istanbul BSL-2-3* or *Samsun BSL-2 Lab***

car refrigerators, **min. distance :** 100 km, **max. distance:** 1000 km

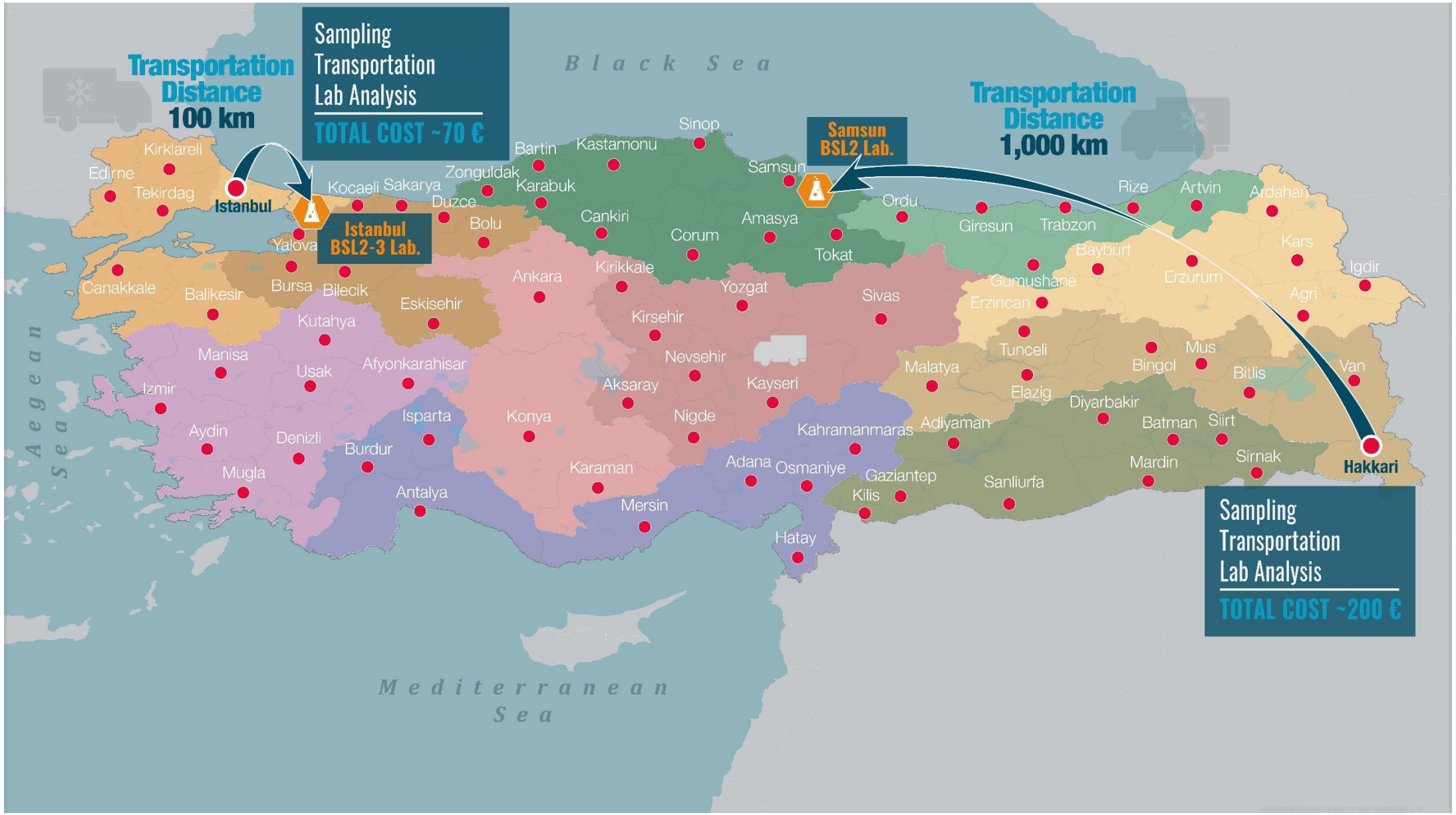
The Pilot City: ISTANBUL with 15 million inhabitants

5,700,000 m^3/day domestic wastewater

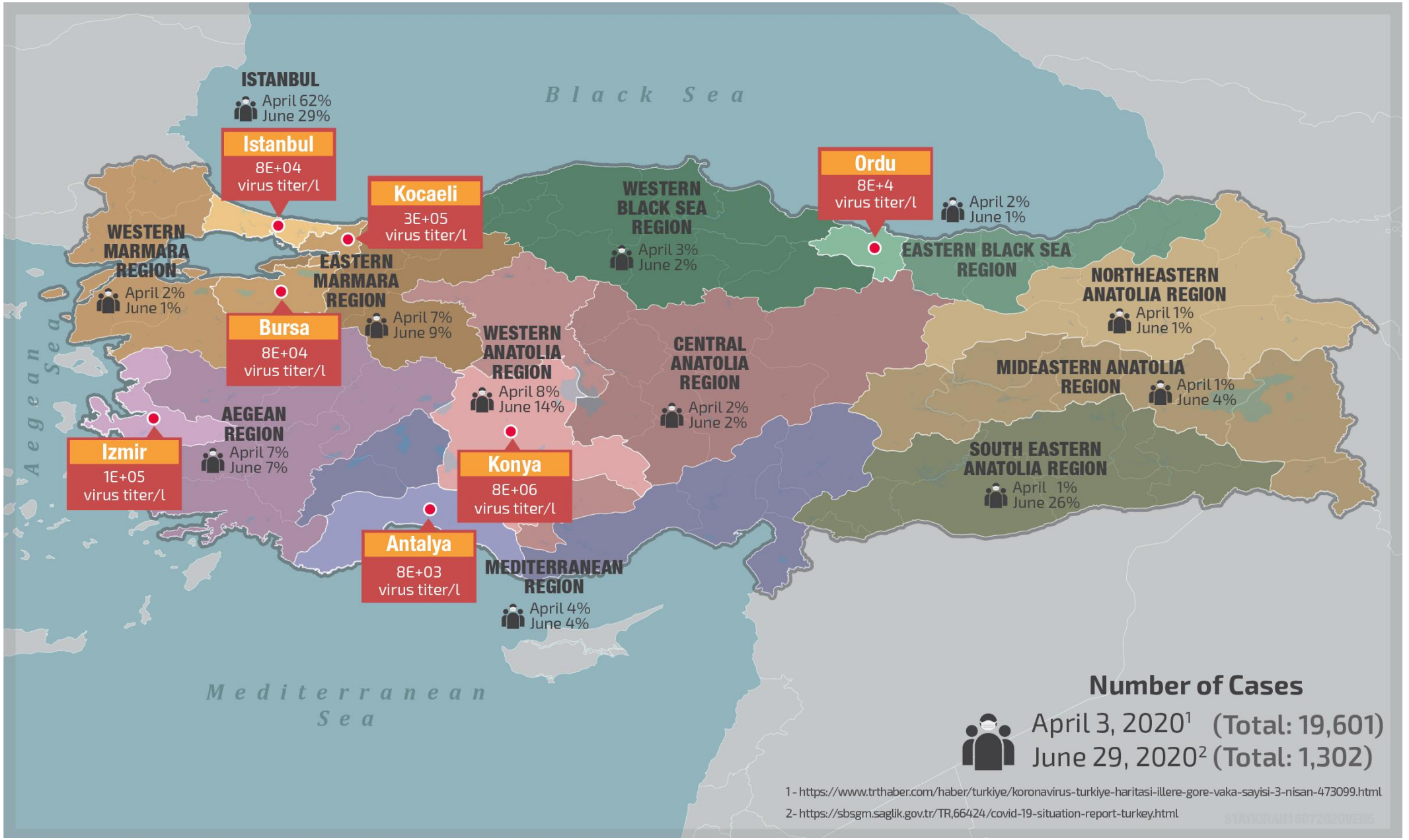
7 Preliminary Treatment : 4,000,000 m3/day , 8 Biological Treatment : 6000 m3/d, 9 Advanced Biological Treatment : 1,700,00 m3/d

	1 Canta WWTP	2 Silivri WWTP	3 Selimpasa WWTP	4 Buyukcekmece W.	5 Ambarli WWTP	6 Atakoy WWTP		7 Pasakoy WWTP	8 Tuzla WWTP	
Actual Flowrate (m^3/day)	13,081	20,798	35,555	84,115	368,586	190,000	281,000	214,160	380,573	108,958
Actual Population Eq. (cap.)	52,324	83,192	158,022	340,000	1,474,344	950,000	1,405,000	1,070,800	1,500,000	450,000
Primary Sludge	N/A	N/A	N/A	N/A	✔	N/A		N/A	✔	
Waste Activated Sludge	✔	✔	✔	✔	✔	N/A	N/A	✔	✔	✔

COST ANALYSIS

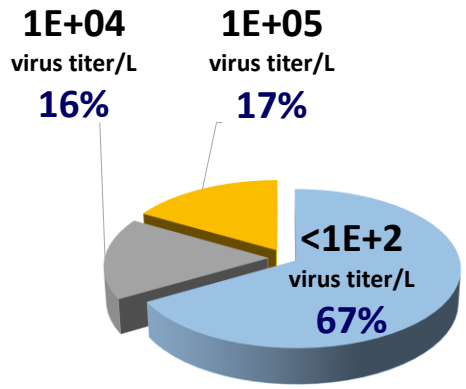


RT-qPCR RESULTS

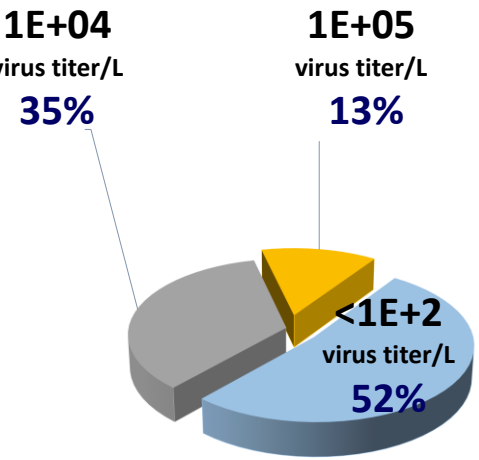


SARS-CoV-2 levels for sewage and wastewater in ISTANBUL

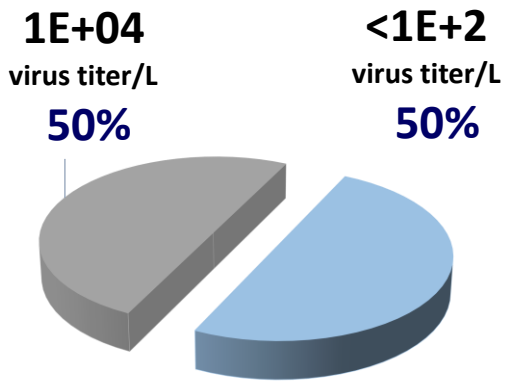
INFLUENT LEVELS (24 samples)



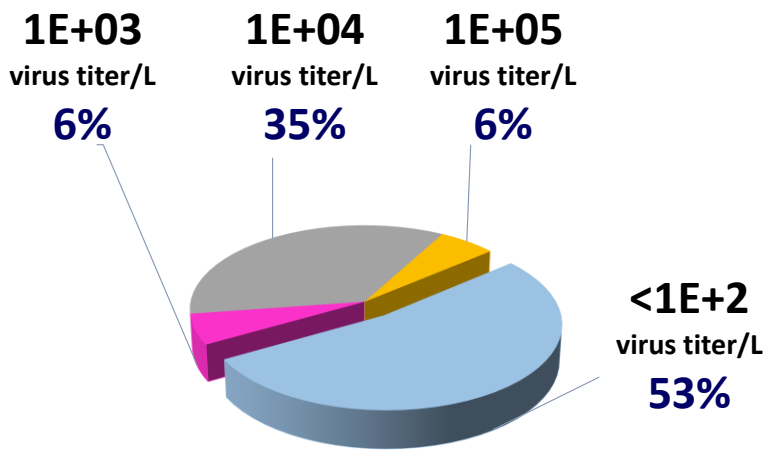
EFFLUENT LEVELS (24 samples)



PRIMARY SLUDGE (2 samples)

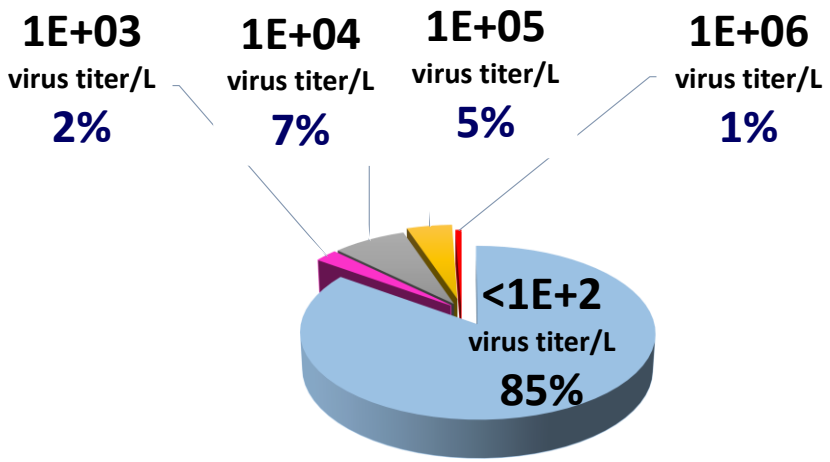


WASTE ACTIVATED SLUDGE (17 samples)

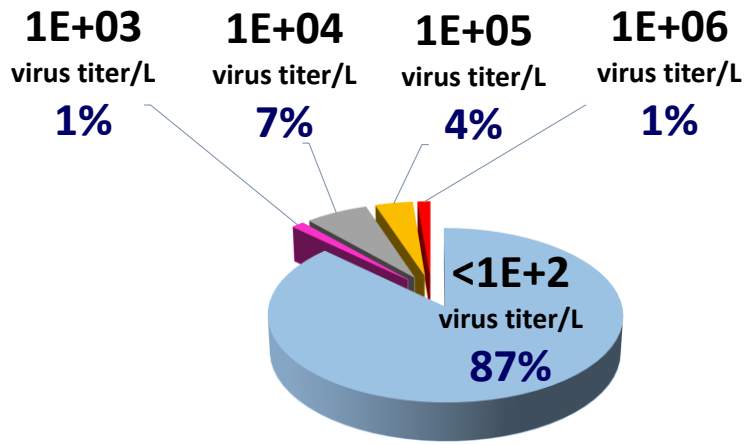


SARS-CoV-2 levels for sewage and wastewater in all of the 81 cities in Turkey

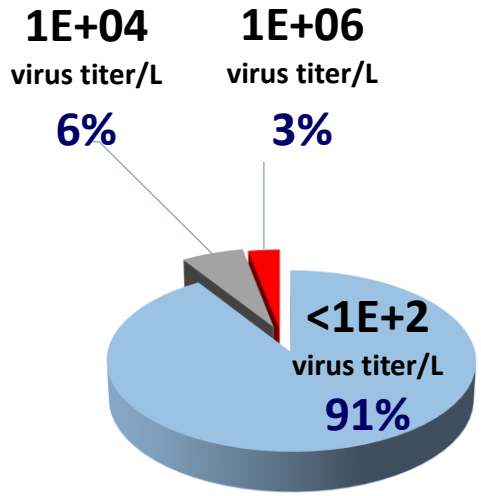
INFLUENT LEVELS (172 samples)



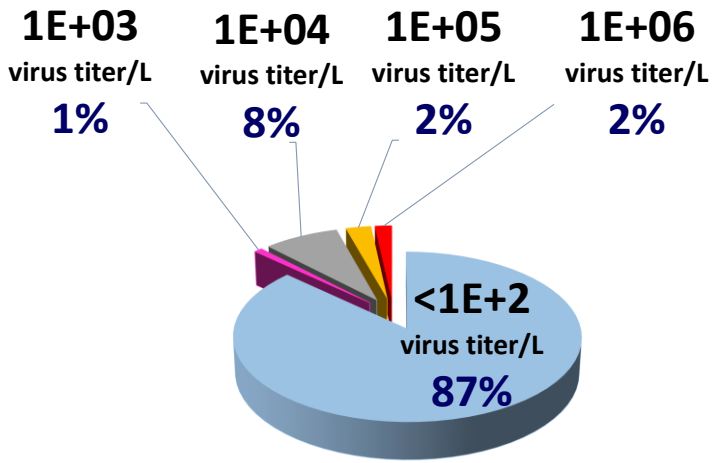
EFFLUENT LEVELS (156 samples)



PRIMARY SLUDGE (33 samples)



WASTE ACTIVATED SLUDGE (115 samples)



Pre-print Publication-I:

First Data-Set on SARS-CoV-2 Detection for Istanbul Wastewaters

https://www.medrxiv.org/content/10.1101/2020.05.03.20089417v1

Pre-print Publication-II:

SARS-CoV-2 Detection in Istanbul Wastewater Treatment Plant Sludges

https://www.medrxiv.org/content/10.1101/2020.05.12.20099358v1

Is SARS-CoV-2 **Active or Inactive** in wastewater and sludge ?

5 cities, 32 samples

(SARS-CoV-2> 1E+4 virus titer /L)

(***vera cell line human kidney epithelial cell***)

Influent

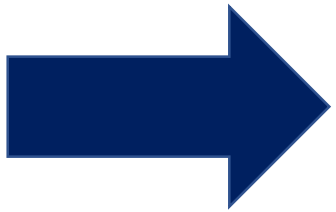
Effluent

Primary Sludge

Waste Activated Sludge

Before Disinfection (U.V)

After Disinfection (U.V)



31 Samples INACTIVE

1 Sample (WAS) → ACTIVE

?

WHAT WE WILL DO….

- **Routine Sampling**

  especially from Istanbul, other mega cities and resorts

- **New Generation Sequence (NGS) analyses of selected samples**

  Complete viral genome sequencing

  Variant detection

  Where did the SARS-CoV-2 virus come from to Turkey?

  *A*ssess whether it has evolved

- **Research on development of quicker &cheaper virus concentration method**

  Magnetic nano particles + MIP (Molecular Imprinting Polymers)

- **Biosensors**

Major Challenges in Surveillance Studies

- Political will
- Cost
- Man-power
- BSL 2 – BSL3 labs
- Availability of consumables
- Primers !!!
- Duration of analyses (Available virus concentration method!!!)
- Seasonal conditions

THANK YOU……