Citizen Science programme – Context

- Monitoring of water resources is a pre-requisite to ensure protection, conservation, maintenance, and restoration of Río Atrato and its basin, as requested by the T-622 court ruling.

- Monitoring of water resources is carried out by Colombia national (IDEAM) and regional (CODECHOCÓ) environmental authorities. Due to their limited resources, the density of the monitoring stations is low and the frequency of monitoring is about twice a year.

IDEAM - Instituto de hidrología, meteorología y estudios ambientales (Institute of hydrology, meteorology and environmental studies)

CODECHOCÓ - Corporación autónoma regional para el desarrollo sostenible del Chocó (Regional autonomous corporation for the sustainable development of Chocó)

Citizen Science programme – Objectives

- From a community perspective:
  - Listen and give a voice to Río Atrato and its tributaries by documenting the communities' observations in a robust way
  - Train the communities to be better equipped to understand and challenge the monitoring work carried out by environmental authorities
  - Provide data for communities to advocate for their rivers and their right to a safe and healthy environment

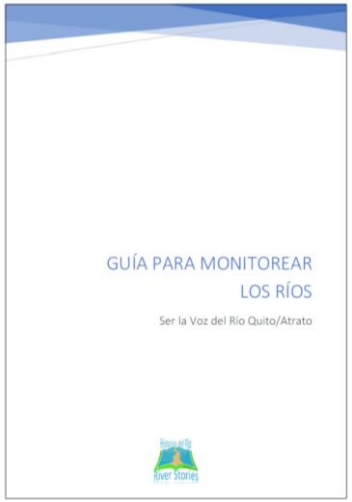
- From a scientific perspective, build an environmental baseline by regularly measuring river health indicators:
  - To overcome data scarcity
  - To better understand the river dynamics under threats from alluvial gold mining
  - To assess if the situation is improving once the T-622 court ruling is fully implemented

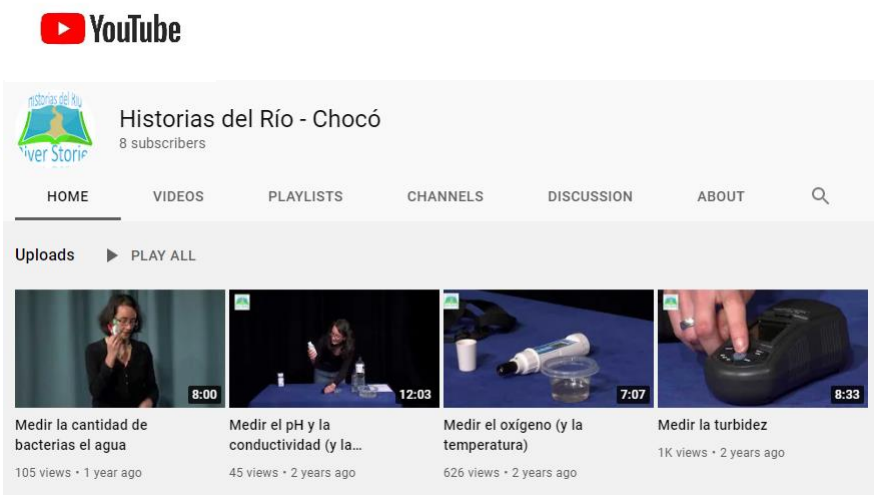
Programme implementation

- Programme implemented in close collaboration with Pastoral Social and local river guardians
- Workshops to socialise the project (open to the entire community)
- Capacity building workshops (smaller group e.g. community leaders, students)

Content of the monitoring programme

- Sampling at weekly frequency and exchange
  - Decide where to sample for bacteria counting
  - Document the process (photos)
  - Send the measurement results
- Monthly verification that the equipment work properly
- Calibration when required done at Pastoral Social
- Supporting documents





River sampling

Measurement of water level

Sampling

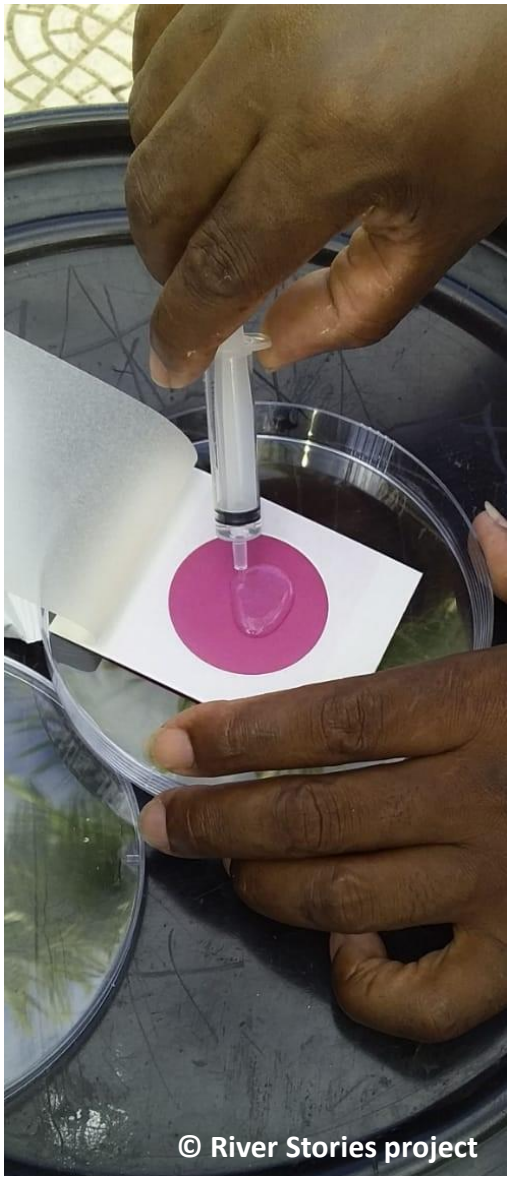
Measurement of oxygen

Measurement of turbidity

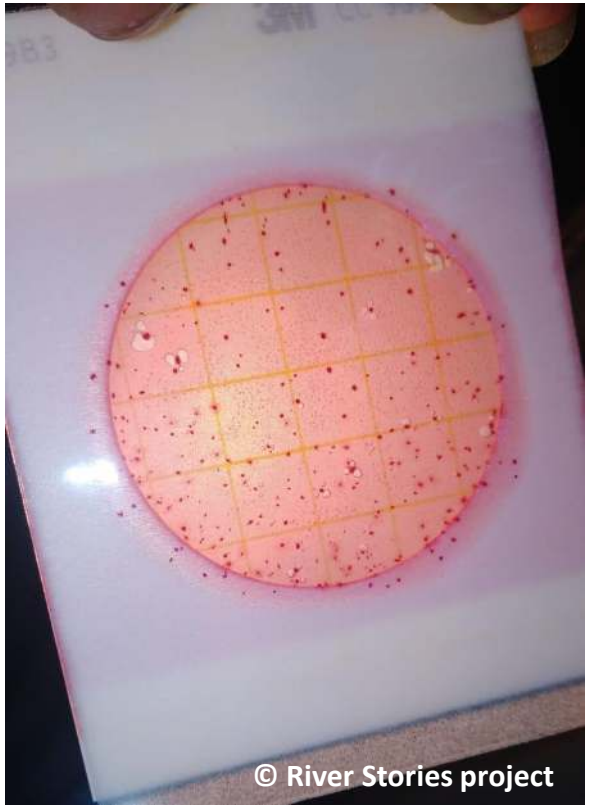
Measurement of pH and conductivity

Drinking water sampling for bacteria counting

Sampling for bacteria counting



Bacteria counting plate



Example of bacteria growth

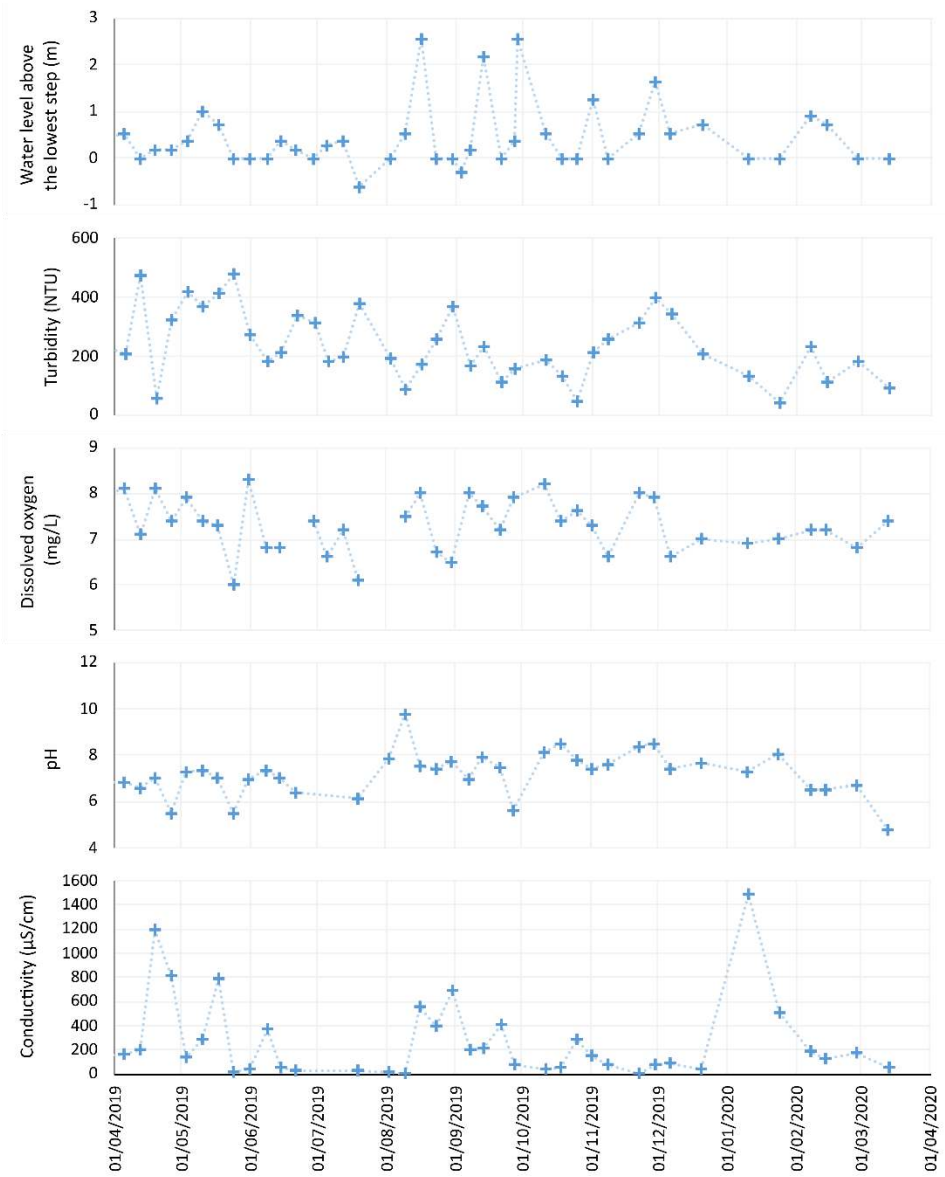
Programme timeline

- Monitoring from April 2019 to March 2020 in Paimadó, Río Quito

- Visits by the UK team in July and September 2019
  - Sediments analyses (UTCH laboratory); turbidity measurements along a cross-section across Río Quito
  - Presentation of preliminary results / adjustments of the monitoring programme after discussion with the citizen science team

Scientific achievements

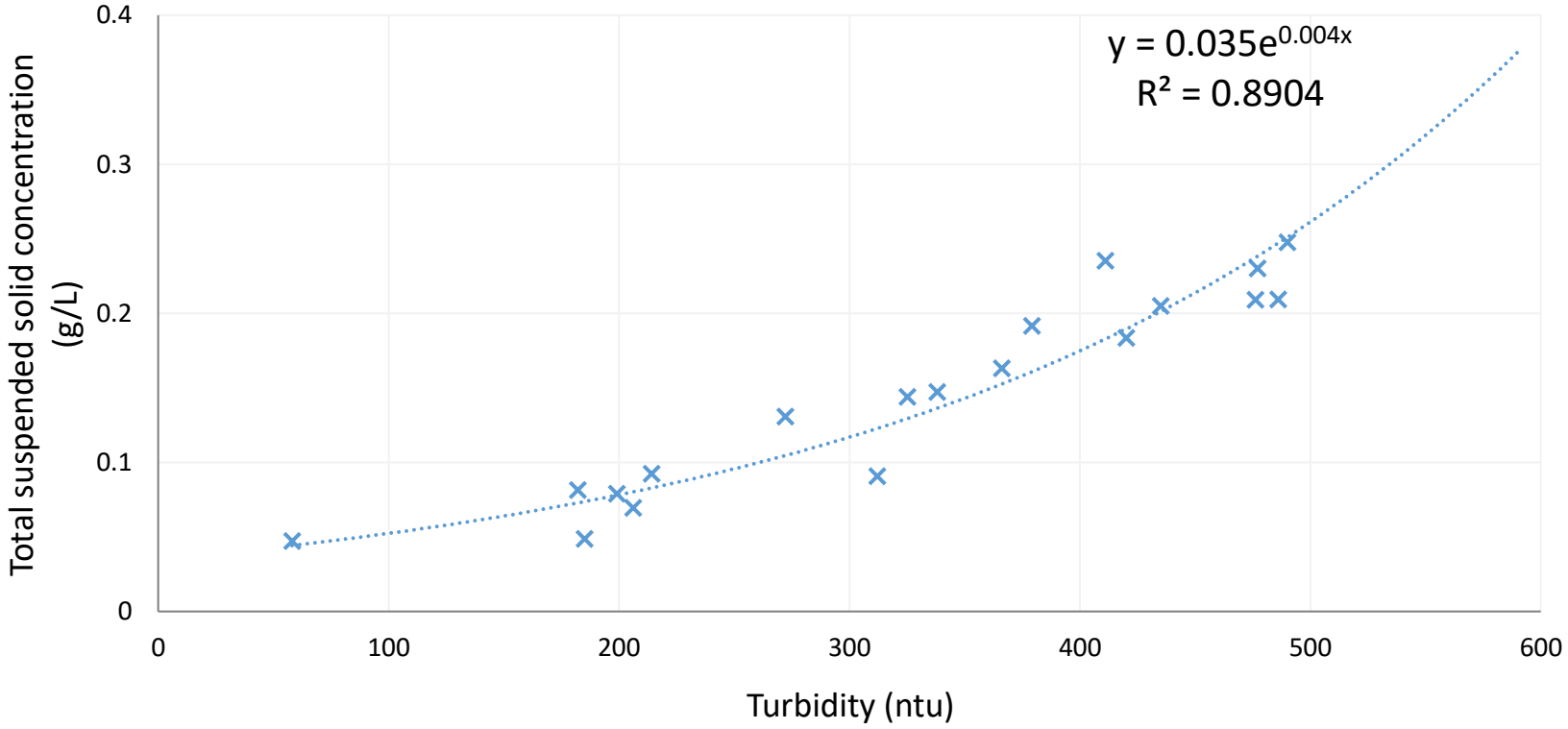
- One-year weekly time series



Scientific achievements

- Relationship between turbidity measurements and concentration of suspended sediments in the river:

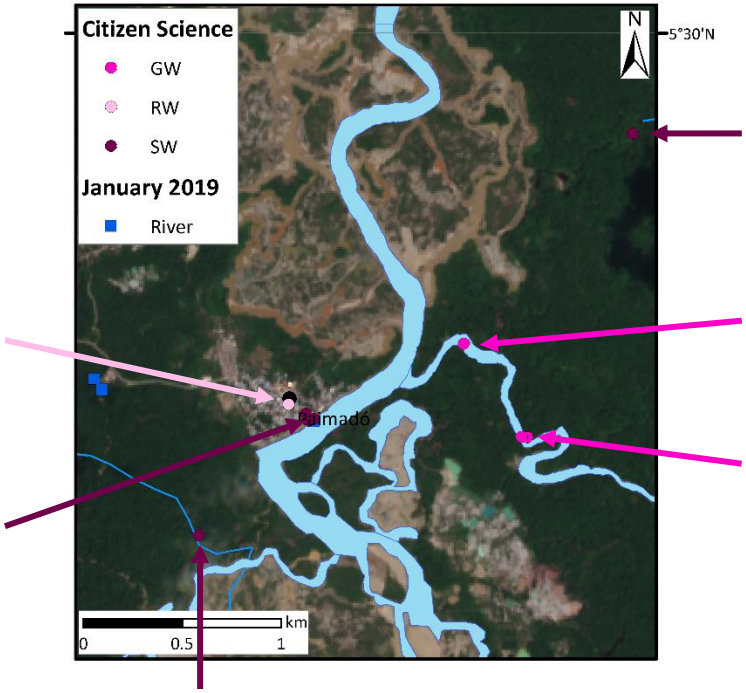
  the concentration of suspended sediments in the river can now be estimated with a simple turbidity measurement



Scientific achievements

Casa (agua de lluvia)
All types: 258 (0-1001) per mL
Coliforms: 72 (0-283) per mL

Río Quito
All types: 589 (540-660) per mL
Coliforms: 54 (44-61) per mL



Quebrada la Catalina
All types: 189 (2-344) per mL
Coliforms: 8 (0-18) per mL

Chorro Sara
All types: 19 (7-55) per mL
Coliforms: 3 (2-4) per mL

Chorro Mauricia
All types: 69 (9-150) per mL
Coliforms: 2 (0-4) per mL

Tambodosito
Todas colonias: 143 (1-455) per ml
Fecales: 17 (0-46) per ml

- Bacteria counting confirm the community perception on the quality of their drinking water sources i.e. water from the ‘chorros’ (which infiltrated through the soil) has a better bacteriological quality.

Achievements (others)

- By engaging in the production of scientific data, the community leaders are better equipped to understand scientific data. They can link these data to their own perceptions. The community at large benefits from the programme by strengthening its environmental citizenship.
- The guardians use the data to evidence environmental damage of their rivers and to defend their rights to a safe and healthy environment.
- WWF Colombia launched its own citizen science programme based on this one. Their programme is implemented in four communities.
- Citizen science programmes can be designed to tackle a whole range of issues such as loss of biodiversity (indirectly targeted by this one) and climate change.

Achievements (others)

- A citizen science programme should not be a substitute to institutional monitoring: the validation of the data or acquisition of additional data require equipment and technical skills that can only be provided by state agencies. Instead, a citizen science programme is seen to be complementary to institutional monitoring, providing the opportunity to increase the frequency of monitoring and/or to cover a larger territory.