SUPPLEMENTARY MATERIAL 2

Case-studies of the development of Observatory nodes, local capacities and network interactions. Examples.

Sites 1, 2 and 3: San Antonio (BSA), Las Grutas (LG) and Río Negro (RN)

The observatories San Antonio (BSA) (40.73°S, 64.91°W), Las Grutas (LG) (40.87°S, 65.08°W), and Río Negro (RN) (41.02°S, 62.79°W) are located on the Atlantic coast of the Province of Río Negro in North Patagonia, Argentina. This region features two distinct oceanographic regimes: a small portion to the northeast corresponds to the estuarine front at the mouth of the Río Negro, characterized by low-salinity waters, while to the south, subantarctic-origin shelf waters diluted by continental discharge (Falabella et al. 2009). Additionally, this area marks the transition between two biogeographic provinces: the Argentine Province to the north and the Magellanic Province to the south (Scarabino 1977; Menni and López 1984). As a result, the region boasts unique biological diversity, leading to the selection of these observatory sites for their scientific relevance and importance in the management of coastal marine resources. The goal is to collect long-term environmental data to provide a solid foundation for local research and resource management. The BSA and LG nodes were initiated in March 2020, and later, in August 2021, the RN node. Although these three nodes are independent, in their origins they were centralized in the Laboratory of Biodiversity and Ecosystem Services at the Faculty of Marine Biology of the National University of Comahue. Participation in the Microsudaqua Workshop 2020 was crucial for becoming aware of the observatory network. This participation facilitated the standardization of measurement protocols for variables and provided support from other nodes with supplies, reagents, recommendations, and determinations. Currently, the three observatories involve several participants responsible for sampling, sample analysis, and reporting. Moreover, the observatories provide environmental data that support various lines of research in the area and represent a good example of horizontal interdisciplinary collaboration among students, researchers and institutions.

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Site 4: SAMO

SAMO (South Atlantic Microbial Observatory) is located in the South Atlantic Ocean, in the marine portion of Laguna de Rocha natural protected area (DINAMA, 2010). The sampling station (34°42'43.36"S, 54°14'08.64"W) was established as a microbial observatory in 2014, in the frame of an international initiative for microbial life survey, i.e. Ocean Sampling Day (Kopf et al. 2015). The station is 2.3 nautical miles from the coast and close to the 20 m isobath. It is the only aquatic microbial observatory in Uruguay, and joined the μSudAqua micro-observatories network since its beginning in 2017. The μSudAqua network is a reference for exchange in terms of methodological and conceptual approaches to gather and analyze data on aquatic microbial communities and their environment. Current collaborations include flow-cytometry training (starting in 2022 with Fernando Unrein as visiting professor) and ecological modelling (starting in 2024 with Erick Mateus-Barros as post-doc). Next year, in the frame of the recently

launched Regional Postgraduate School in Microbial Ecology of Aquatic Systems, further training will be achieved with the participation of several researchers and students of the μSudAqua network.

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Site 7: BroaMO

The Broa Microbial Observatory (BroaMO) was established at a small, shallow reservoir known as the Broa Reservoir or Lobo Reservoir (47°53'44.2"W, 22°10'58.2"S). This reservoir is dammed to meet local needs for water, energy supplies, and recreation. Due to its regional significance and proximity to some study centers in ecology and environmental management, the site has been extensively studied since the 1970s (e.g., Rocha and Matsumura-Tundisi 1976). However, it had not previously hosted a long-term microbial observatory. Sampling began on March 15, 2018, following the initial call for the establishment of observatories proposed by the μSudAqua network in late 2017. Since then, samples have been collected monthly, leading to the accumulation of extensive environmental and microbial data. The observatory has since become a training ground for newcomer students and a venue for testing new methodologies. Additionally, visiting researchers are regularly invited to participate in sampling cruises and interact with lab members. Over the years, some challenges have included maintaining sampling routines during the COVID-19 pandemic and managing sample processing, particularly when using equipment maintained by other study centers.

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Site 10: Luján River (LJ)

The Río Luján sampling site is located in the urban area of the city of Luján, very close to the city center (93992 inhabitants). The surroundings of the sampling site are highly frequented by religious tourism on weekends, with an influx of approximately 1,000,000 people/month. Although the Luján River has been studied in numerous investigations, since the 1990s studies have become frequent in the entire basin and/or in the sub-basins (del Giorgio et al. 1991). Many studies were also carried out in different seasons of the year and different biological communities were studied (O'Farrell et al. 2002; Guichón and Cassini 2007), most investigating the effect of industrial and/or agricultural pollution on water quality and biodiversity (Graziano 2021), however none of these studies were accomplished in the observatory format. Based on the proposal of the μSudaqua network to form observatories, from 2019, we decided to sample the Luján River monthly in a place where we always had access and were of interest to the community in general and for us.

The people who implement this observatory do it in addition to our main work topics, at the moment it is not part of any thesis, but, we intend to know more about the Luján River from these samplings and that in the future it will be part of a project for the training of human resources.

The exchange of protocols and the sharing of laboratory techniques were very important. The possibility of collaboration in the analysis of samples with equipment from another observatory

is also extremely valuable, since it makes possible, for example, the counting of samples by cytometry, the joint sending of DNA samples, among others.

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