

PRACTICAL METHODOLOGICAL GUIDE

APPENDIX VI. Results Obtained Climate Mini-Lab



“UN SOLO PLANETA PARA TODAS LAS PERSONAS”



APPENDIX VI. Results Obtained. Climate Mini-Lab

The Climate Mini-Lab allowed students to analyze real climate data from AEMET and Mapaclima, comparing the current situation in their municipality with historical data and future projections. The activity fostered the development of scientific skills related to data collection, interpretation, and analysis, while also reinforcing critical thinking in the face of climate misinformation. In all municipalities, there was a noticeable improvement in students' ability to base their opinions on scientific evidence and to understand that climate change must be analyzed based on long-term trends rather than isolated weather events.

Campillos

In Campillos, students found that the average annual temperature had risen from 15.8 °C (1961–1990) to 16.2 °C (1985–2014). At the same time, the number of days with temperatures above 40 °C doubled, rising from 1 to 2 days per year, while the number of tropical nights increased from 5 to 9 per year. Additionally, annual precipitation decreased from 475.7 mm to 392.9 mm, reflecting a significant decline in water availability.

The projections analyzed also showed that this trend would continue, with a projected increase in average temperature and a rise in extreme heat events over the coming decades. This evidence helped the students understand that the effects of climate change are already observable in their own environment and that the changes detected reflect sustained trends over time. The activity reports indicate that this activity particularly fostered scientific discussion and helped dispel the notion that “the weather has always been the same.”

Casares (Secadero)

In Secadero, students also identified significant changes in local climate trends. Analysis of historical data series showed an increase in the average temperature from approximately 17.2 °C to 17.6 °C, accompanied by a rise in the number of hot days from 4 to 8 per year and in the number of tropical nights from 5 to 10 per year. At the same time, annual precipitation decreased from 566 mm to 527.7 mm, indicating a trend toward greater aridity.

The future projections analyzed during the activity reinforced this trend, showing a gradual increase in both temperatures and the frequency of tropical nights and heat waves. The students linked this data to phenomena they had observed in their everyday lives, such as longer summers, a greater heat index, and more prolonged

periods of drought. According to the engagement reports, this activity helped the group begin to use scientific data to support their arguments during debates, replacing explanations based solely on personal experiences.

Carcabuey

In Carcabuey, the analysis revealed an increase in the average temperature from 15.0 °C to 15.4 °C between the two periods analyzed. The students also found that the number of hot days rose from 1 to 3 per year, while the number of tropical nights tripled, increasing from 2 to 6 nights per year. At the same time, annual precipitation decreased from 592.8 mm to 543.8 mm.

While studying historical records, researchers also analyzed certain extreme events recorded in the province, such as the all-time high temperature of 46.9 °C, reached in August 2021, as well as the occurrence of months with virtually no precipitation and others with very heavy rainfall. Finally, climate projections indicated that the average temperature could reach 17.1 °C by mid-century, with a simultaneous increase in the number of hot days and tropical nights and a further decrease in average precipitation.

The engagement reports indicate that these data particularly surprised the students, who initially tended to associate climate change solely with rising temperatures but later developed a broader perspective that also included decreased precipitation and the intensification of extreme weather events.

Almodóvar del Río

In Almodóvar del Río, the students analyzed climate trends in the province of Córdoba, noting an increase in the average temperature from 17.2 °C to 17.6 °C between the two climate periods. The data also showed an increase in the number of hot days from 4 to 8 per year and in the number of tropical nights from 5 to 10 per year, accompanied by a decrease in annual precipitation from 566 mm to 527 mm.

Analysis of historical records also made it possible to identify recent extreme events, including the absolute maximum temperature of 46.9 °C recorded in the province and an increasingly irregular distribution of precipitation. When comparing data with that from the century-old Izaña observatory, the students observed how average, minimum, and maximum temperatures have shown a sustained upward trend over the last century, while precipitation has become more irregular and the number of wet years has decreased.

According to the activity reports, this activity particularly fostered cooperative learning and helped students understand the difference between climate and weather—one of the concepts that initially caused the most confusion.

Northern District of Granada

In the Northern District of Granada, students analyzed climate trends in the province of Granada using historical data from AEMET and projections from Mapaclima. The analysis showed that the average annual temperature rose from 14.9 °C (1961–1990) to 15.2 °C (1985–2014), while annual precipitation decreased from 489.4 mm to 450.1 mm, indicating a gradual reduction in water availability. Likewise, the students observed an increase in the frequency of extreme weather events, with the number of hot days exceeding 40 °C rising from approximately 10 to 20 days per year, and the number of tropical nights increasing from 6 to 10 per year.

Analysis of historical climate records also identified extreme values recorded in the province, such as an absolute maximum temperature of 46.0 °C, a minimum temperature of -4.8 °C, and monthly precipitation events reaching 365 mm, illustrating the increase in climate variability.

Future projections reinforced this trend. The students found that the average temperature could rise from 14.3 °C (2015–2040) to 15.3 °C (2021–2050), while precipitation would decrease from 489.3 mm to 466.2 mm per year. Similarly, the number of tropical nights would increase from 7 to 11 per year, confirming a scenario of greater warming and reduced water availability for the coming decades.

Overall Results

Collectively, the Climate Mini-Lab enabled students from the five municipalities to observe, through scientific data, a common trend: rising average temperatures, an increase in the number of hot days and tropical nights, a decrease in precipitation, and a projected intensification of these changes over the coming decades. Beyond learning about climate-related content, the activity strengthened students' scientific literacy, data interpretation, and information verification skills, helping to debunk climate myths through the use of verified evidence. The activity reports unanimously note that working with official information fostered greater trust in scientific sources and improved students' ability to make arguments based on data, which they subsequently applied to debates, intergenerational meetings, and proposals submitted to city councils.



**NOPLANETB – ACORTAR DISTANCIAS ENTRE CIENCIA Y SOCIEDAD
PARA PROMOVER UNA ESTRATEGIA DE TRANSICIÓN INTEGRADORA
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