123 Level C 123 Level P40

<u>Regenerating Urban Space to connect People in a Healthy</u> <u>Environment</u> <u>From local action to regional impact</u>

Open spaces, parks, water surfaces and pathways for ventilation

Building upon the conceptual understating of the role of different surface materials in a city shown in the description of City Challenge 2 in material P39-L, this example for a challenge in the frame of "Regenerating Urban Space to connect People in a Healthy Environment" connects individual places to the concept of space, neighborhoods, and an urban area as a whole. While we address in this example again the issue of urban climate, urban spaces are more than a physical environment in which we live. They are cultural environments, spiritual environments, historical spaces, and more. Thus, a livable and loveable city is more than a physically agreeable place. A park does not only affect the physical space in terms of its temperature, it provides a social space to connect and meet people, a cultural place to experience arts, and often a place to reflect on the past and develop ideas for the future. Thus the example for a City Challenge provided here is intended as an inspiration to conceptualize the own living environment as part of a whole and to stimulate the notion that changes in the own living environment have an impact on other areas and people and vice versa. Thus, we encourage students and teachers to develop a City Challenge which addresses their specific interests and needs.

Based upon the fundamental introduction into the method of scientific research (materials P1-P4), a school learning, exploring and activity path (LEAP, see chapter 2.2 of the PULCHRA Handbook of Educational Materials) is a good starting point to explore different environments, to understand and document their character and to share the findings with others using analogous or digital tools (materials P5-P12, P24). The different learning materials in paper form or as apps (material P28) may be used to guide the learning, exploration and activities,



Figure 1: Example of the integration of a school LEAP with a City LEAP

and to develop a research plan. Figure 1 provides an example of a LEAP concept, which integrated a school LEAP and a city LEAP that includes citizens as a whole. The LEAP stations are equipped with iButtons or other temperature loggers, which are housed in radiation shield (see material P35). The school LEAP allows easy access to facilitate regular visits in the frame of lectures or other school activities. The city LEAP stations may be placed where the students

live or at other interesting locations which show the specific thermal characteristics. As iButtons are affordable devices it should be feasible to acquire the needed financial support





from school associations, parents, NGOs, cities, or other supporting agencies or entities. Professional climate stations might also be available in the city as points of reference.

Students explore the climate of their school and their city and learn about the relationship of surface type / surface character and air temperature. This is particularly interesting and relevant during heat waves and high air pressure situations. Exploring the relationship of temperature patterns and wind direction or temperature and green area within the vicinity is essential to understand pathways to mitigate the increasing likelihood of excessive heat and to take appropriate measures such as create shadow, allow for evaporation, maintain a suitable ventilation in the city etc.

Again, as shown in Figure 1 of material P39-L, schools are envisioned as centers or hubs for learning, innovation and societal participation. Students define the City Challenge (here: identify pathways to prepare the city to reduce the impact of excessive heat) and define the research method (e.g. based upon the educational materials provided or on other resources available to the school). They analyze their data, report the findings, and cooperate with the



Figure 2: Example for the relationship of surface temperature and green area in Cologne/ Germany

public during the project and when communicating the results and discussing possible pathways for action.

Material to make the transition from local measurements to regional effects are freely available on the internet e.g. through European or NASA web sites¹. Educational resources on satellite images to track changes over time are also available². Also high-resolution images may be available for your city (e.g. through cooperation with local universities).

Figure 2 shows an example of a surface temperature image in relationship to the existence of green surface area. The NVDI is an index, which yields high values is green vegetation

Authors: Karl Schneider and Tim G. Reichenau, Institute of Geography, University of Cologne, 2020

¹ <u>https://cds.climate.copernicus.eu</u>, <u>https://worldview.earthdata.nasa.gov</u>, <u>https://climate.nasa.gov/earth-now/</u>

² <u>https://pubs.usgs.gov/gip/133/, http://www.esa.int/SPECIALS/Eduspace_EN/,</u> https://www.esa.int/Education/Teachers_Corner/European_Space_Education_Resource_Office_









The PULCHRA Collection of Educational Materials is part of the PULCHRA Handbook of Educational Materials. An additional document on approaches to evaluate the PULCHRA teaching methods of Open Schooling and inquiry-based learning will be published along with this document.

The initial version of the PUCLHRA Collection of Educational Materials was compiled by the PULCHRA team at the Institute of Geography of the University of Cologne in Germany in 2019 and 2020.

During the course of the City Challenges between 2020 and 2022, this collection will be extended by PULCHRA teams from the partner countries and by teachers and Science Teams at the schools of the PULCHRA Network of Schools.

<u>Project leader:</u> Prof. Dr. Karl Schneider, karl.schneider@uni-koeln.de

<u>Contact:</u> Dr. Tim Reichenau Universität zu Köln Geographisches Institut Albertus-Magnus-Platz 50923 Köln

tim.reichenau@uni-koeln.de Tel. 0221/470-6823 Fax 0221/470-5124