**Llobregat Valley (Lower Llobregat Valley), Spain**

The Llobregat river basin, with an area of ​​4,930 km2 and a total length of 175 km, is the largest inland basin in Catalonia. The course of this river has been widely exploited for various uses: agricultural, industrial and consumption, among others, for many decades. The part of the Llobregat basin that belongs to the metropolitan area represents only 4.74% of the total and corresponds to an intensely humanized space. However, this area plays a key role in the ecological and social connectivity of the metropolitan area. We are facing a space with different demands, with great potential in terms of the contribution of ecosystem services, which coincides with a fundamental corridor of infrastructures and in the main gate of Barcelona, ​​as both the port and the airport are located in their delta. But despite this pressure, which has resulted in a dramatic reduction in the river area and its quality in recent decades, the river space still offers opportunities to promote ecological and social connectivity, as well as to ecosystem maintain and improve metropolitan biodiversity and its role as an ecosystem service provider in the metropolitan area. Many recent restoration actions led by AMB have significantly improved the quality of this space. Consolidation of river side parks El Prat and Sant Boi de Llobregat was an important part of environmental recovery along the Lower Llobregat Valley. Special focus was put on the dynamic aspects of the river landscape, enhancing and combining biodiversity recovery, the multiple functions of green spaces and the needs of the community (recreation: creation of walkable path and bike trams).

**State of the Urban Forest.** Most of the area belonging to the Lower Valley of Llobregat river corresponds to non-urbanisable soil and it is part of various protected areas (especially belonging to Parc Agrari del Baix Llobregat, and a smaller part of the Llobregat Delta. As for the riparian forests, the Llobregat river, in its metropolitan section, follows a mostly rectilinear route, practically channelled for the most part and without a meandering trace or a consolidated “natural” riparian forest. There are only a few patches of Populus, Salix, Fraxinus, Alnus, Ulmus or Tamarix that are largely the result of recent plantations, but which in no case form the characteristic plant communities and the structure of these forests. Only small, well-preserved pieces of riparian forest have been identified in some areas (i.e. close to Molins del Rei or Sant Andreu de la Barca). Preserving and connecting these patches with other green typologies would increase landscape connectivity and favour biodiversity. The agricultural activity of the Agrarian Park metropolitan area has a strategic value in the metropolitan area, and not only because it provides local food production, but also because it has play an important role in the water cycle, increase the complexity of the landscape, guarantee ecological functionality, increase biodiversity, order open spaces, reduces the danger of flooding and the danger of fire and helps to take advantage of the territory’s own resources with a logic of green and circular economy. It will also be important to encourage the treatment of edges between urban tissues and open spaces, through the recovery of agriculture, restoring degraded contact strips, managing intensities of use or ordering peri-urban uses, among others. UF-NBS can be related to preserving or recovering territorial “cultural memory” or past landscapes. The shrub fringes with woody Mediterranean species which limit the crops of the Agrarian Park of Llobregat, are reservoirs of biodiversity (i.e. fauna) and have an important role in biological control of pests. Another possible UF-NBS related to agricultural landscape can be related to the recovery of certain Mediterranean species for croplands.

**Governance, planning and policy landscape.** This area has a complex institutional framework, with multiple levels of government. The total length of Llobregat river corresponding to the Metropolitan Area of Barcelona consists of 30 km, along 16 municipalities, from Martorell to Prat de Llobregat. The main administrations with territorial planning competences are the Generalitat (The Government of Catalonia), municipalities (The City Councils corresponding to the mentioned municipalities) and special urban organizations and the Metropolitan Area of Barcelona. Institutional framework is also completed by the two public consortia in this area, belonging to the City Councils, the Metropolitan Area of Barcelona, Generalitat or Diputació de Barcelona (Barcelona Provincial Council). These are represented by the Consortium of Agrarian Park of Baix Llobregat and the Consortium of Natural Area of Llobregat Delta, corresponding to the network of protected areas.The future Planning document at metropolitan level will be the metropolitan PDU (*Pla Director Urbanistic Metropolità*; Urban Master Plan; AMB, BR, 2019), which will replace the old PGM. It will be also applicable in the municipalities along the Llobregat river, as they are part of the metropolitan area. PDU has been shaped in 2015, and now it is an ongoing document, which has been recently approved (2021). Related to the Llobregat study area, the plan considers the importance of the ecological structure within the metropolitan territory. The ecological structure is seen as an important axis related to water and includes the main hydrographic axes, water canals and the coastal line, but also the other areas related to hydrology: aquifers, wetlands, lagoons, coastal areas and beeches. These elements belong to the blue structure, but they are intrinsically related to the green infrastructure planning.

**Participation citizen science & contestation.** The metropolitan PDU already involved 500 experts and a complex participatory process, with more than 10.500 participants along the metropolitan area. One of the main objectives of this participatory process was to disseminate and explain the PDU process to the participants, assure stakeholders engagement and define territorial challenges. It is the first planning process at this scale, involving participatory process from the first stages. Among the citizen science activities focussed on creating indicators of urban diversity in the area, it is worth mentioning the Observatory related to the urban butterfly monitor scheme (uBMS). The Observatory is based on a collaborative network of volunteers to obtain data on butterfly populations and it has been recently expanded to the Metropolitan Area (http://mbms.creaf.cat/). To date, the Observatory includes butterfly observations from various urban green areas close to Llobregat river: Parc de la Muntanyeta (Sant Boi de Llobregat) and Parc de la Fontsanta (Sant Joan Despí). Other previous and current activities include informative online tools, visualisation tools, citizen engagement activities connected to planning process in the metropolitan parks (such as the AMB “Wildlife Visualisation Tool” or ornitho.cat). With specific focus on the study area, it is expected that future collective data on new planning and governance approaches and on possible UF-NBS in the Lower Valley of Llobregat river to be collected by the **Living Lab** **Llobregat&Co** the participatory mapping created by AMB and CREAF in CLEARING HOUSE. The core of Llobregat&Co is the participatory process across a detailed map of the study area, containing opportunities and challenges related to UF-NBS and other NBS over the territory. Llobregat&Co creates in this way a useful tool to visualise NBS for planners, researchers, but also for citizens.

**Socio-economic trends.** The study area belongs to the Metropolitan Area of Barcelona, which is responsible of 52% of GDP in Catalonia. The Metropolitan Area of Barcelona is a complex territory dealing with important socio-economic pressures. Population aging increased by 8% and 54% of its population have problems accessing a house. Recent simulations which analyse COVID socio-economic impact in the Metropolitan Area (Cruz et al. 2020) estimate that the average annual net income of Barcelona’s metropolitan households have shrunk between 7% and 8% in 2020 (between € 32,330 and € 32,036). Extreme poverty is also increasing (50,000 more people, resulting in a total of 221,000), and there is a slight increase in the intensity of poverty. According to the same study, the most affected social profiles by the current post-COVID economic crisis are children, the young population, the population of migrant origin and the working classes.The 12 municipalities belonging to the study area have a total of 275.569 inhabitants in 2020. Cornellà de Llobegat is the densest municipality in the study area (12.866 inhabitants/km2, data corresponding to 2020). GDP/capita corresponding to the Baix Llobregat county is 33.000 euros. Population growth with migration background has a gross rate per 1,000 inhabitants of 11.6 in 2019, according to IDESCAT data (Statistical Institute of Catalonia).From the socio-residential point of view, the municipalities corresponding to the Lower Valley of Llobregat are mainly included in the typology of zones with population aging and medium income families, with few residential areas inhabited by upper classes.

**Major challenges & knowledge gaps.** One of the major barriers in this area is the lack of a well-defined governance model, which translates into an added difficulty in the planning, design and management of these spaces. In particular, a governance model shared by the main actors involved (multiple administrations, public operators and service companies) needs to be defined. Finally, the danger posed by river floods, the foreseeable scenarios of climate change that require specific planning and management, and the need to consider both high and low water regimes must also be taken into account. On the other hand, with regard to the river exclusively, it was found an alteration of the ecological processes, such as the recharging capacity of the aquifer or the ecological connectivity. Other important barriers are: the urbanisation of the landscape and the river environment, the low phreatic level, the quality and the availability to water the vegetation, the management challenge posted by exotic species, landscape fragmentation and agricultural intensification, the lack of riparian forests (as potential river vegetation), and tree-related landscapes in general, insufficient conservation measures for coastal pinewoods outside the protected areas. The following knowledge gaps are mainly related to research, planning and governance: insufficient knowledge of biodiversity (certain groups) and data on key ES in the area, but also the need for a common ground for prioritization of biodiversity, ES and NBS at various administrative levels; insufficient data on riparian forests and river pollutants. Other knowledge gaps in this complex area are how to enable institutional collaboration, connectivity and networks at various levels; how to assess knowledge and better share information on NBS and related initiatives; how to include NBS in planning and policy frameworks at metropolitan level.