



#### URBAN GREENUP NBS WEBINARS SINGULAR GREEN INFRASTRUCTURE

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#### SINGULAR GREEN INFRASTRUCTURE

#### List of Interventions

- Smart Soil (Biochar) into Green Shady Structures
- Green Covering Shelter for Car Parking Area
- Green Permeable Pavement around Car Parking Area
- Green Shady Structures for Car Parking Area
- Smart Soil Production in Climate-Smart Urban Farming Precinct
- Natural Pollinator's Modules
- Climate Smart Greenhouse in Urban Farming Precinct
- Development of Smart Soils from Mud Plant, to use in Urban Farming
- Green Fences
- Fruit Walls

#### SINGULAR GREEN INFRASTRUCTURE

#### **General Impacts**

The general impacts of Singular Green İnfrastructures are:

- reducing the urban heat-island effect,
- improving urban air quality through carbon dioxide-oxygen exchange,
- increase in plant cover and shadow surfaces and enhancing biodiversity,
- reduction of absorption and retention of heat with highly reflective or permeable surface materials,
- reducing ambient temperature,
- increased richness and abundance of pollinating species,
- increased community engagement,

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#### IAc10- Smart soil into green shady structures

The benefits of green shady structures with smart soils are measured in environmental, economic, and aesthetic or cultural ways. The environmental benefits include conserving water, reducing interior noise pollution, reducing the urban heat-island effect, improving urban air quality, and creating habitats for a diversity of birds, insects, etc. The location of the implementation of smart soil in green shady structures, which designed together with the green covering shelter, will also be placed in car parking lot of İzmir Vilayetler Evi and selected parts of car parking lot of Sasalı Natural Life Park.



#### IAc10- Smart soil into green shady structures



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\*Biochar enriched soil application and CO2 emission measurement

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#### Application of Smart soil into green shady structures





#### IAc14- Green Car Park Covering Shelter

Green covering shelters were installed in the parking lots of Vilayetler Evi and Sasalı Natural Life Park to decrease temperatures and increase pollutant's removal with its planted cover. It is designed to integrate specific vegetation with a minimum maintenance, and their structural features allow providing water for plants, humidity for the ambient, shade for citizens. At the same time, it will capture CO2, reduce surface temperatures by preventing sunlight from reaching the surface. In the summer, green covering shelter will shade the parking lot and, through the process of evapotranspiration will provide cooling.

Expected impacts:

a) they will reduce ambient temperature in about 2-4 oC and NOX emissions by less than 1% and

b) increase in plant cover and shadow surfaces and

c) enhancing biodiversity

Green covering shelters will be built in parking lot of Sasalı Natural Life Park and parking lot of İzmir Vilayetler Evi. The former is in a suburban landscape and the latter is in a very dense urban fabric and completely exposed to adverse effect of sun.

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Final view of Sasalı Natural Life Park Parking Lots



#### IAc15- Green Permeable pavement

Green Permeable pavements allow air, water, and water vapor into the voids of a pavement, keeping the material cool when moist. These pavements will be used to store less heat on the surface and to have lower surface temperatures compared with conventional products. They will help to solve the problem of urban heat islands, resulting from the increasing temperatures of the paved surfaces in cities.

Expected impacts:

a) reduction of absorption and retention of heat with highly reflective or permeable surface materials

b) reduction of surface temperatures by increasing solar reflectance of the surfaces, and accordingly decreasing the air temperatures in summer time
c) resurfacing with permeable pavements will reduce the heat of surface by about 4°C to 10°C and it also will increase car parking cover durability and
d) in addition, new draining will be created



#### Final Views of Permeable pavements



#### Permeable Pavement in Sasalı Natural Life Park Parking Lots



#### Final Views of Permeable pavements



Permeable Pavement in Vilayetler Evi Parking Lots

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#### IAc16- Green shady structures for Car Parking Area

Green Shady Structure will be designed as part of the urban heat island reduction strategies in the selected parking lots as a part of Sub-demo A. It will cover the 2 sides of green car park areas by using fast-growing creepers and climbing plants (adapted to climate conditions) with the usage of perennial deciduous species, which allow pass the sunlight in wintertime. It will help to minimize of in-car temperature through shading.

Expected impacts: a) increasing shadow surfaces b) reducing ambient temperature and c) enhancing biodiversity

The ivy structures (Trachelospermum jasminodes) designed to be planted 3 roots for each 1 m length of the wall of the green covering shelter. And it going to be planted by investigating different conditions of green covering shelter such as: the angle of sunlight, sun/shadow ratio, amount of space for plant etc.



partial view of of Green Car Park Covering Shelter



#### Final Views of Green shady structures



Green Shady Structures in Sasalı Natural Life Park Parking Lots



#### IAc9- Smart soil production in Municipality's arboreal area

The Biochar Production Unit will be located on a 6x15 m area in Municipality's Arboreal site. It is aimed to produce 240 kg of biochar per day by using 400 kg of pruning waste.

As a result of biochar added field applications, the physical and chemical properties of the soils are improved; the initially increased microbial activity becomes stabilized after a while which will cause the amount of organic matter to increase over time due to the degradation process slows down; decreases in the CO2 emission by biodegradation, decreases in the nitrous oxide emission by denitrification and reduction of methane release by methanogenesis at a rate of 5%, 5%, 1% respectively, are expected during the experimental period.





#### Final View of Smart Soil Production Unit





#### Final View of Smart Soil Production Unit



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#### Final View of Smart Soil Production Unit





#### Final View of Smart Soil Production Unit



#### IAc11- Natural pollinator modules

Pollinator's modules or houses are proposed to attract more pollinator insects by proving shelter. Modules are uniquely designed for this purpose and placed in the settings where many pollinator friendly flowering plants are abundant. Although the primary purpose with these modules is attracting more pollinator's species to increase biodiversity, getting people' attention to biodiversity issues should be considered as a co-benefit.

Expected impacts:

a) increased richness and abundance of pollinating species and enhanced biodiversity

b) increased community engagement



#### IAc11- Natural pollinator modules (10 modules)





#### IAc11-Natural pollinator's modules (10 modules)



#### IAc11- Climate Smart Greenhouses

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Climate-smart greenhouses will be built in Sasalı Natural Life Park to illustrate the current and future effects of climate change on urban and rural green vegetation. The greenhouses will demonstrate producing agricultural crop continuously under changed climate condition. Urban farming/community practices/new social forms of organization will be illustrated in the climatesmart urban farming precinct in the special precinct of Sasalı Natural Life Park.



Green houses will be cover by polycarbonate material. Each part of the greenhouse is described below; Greenhouse 1: One part of the greenhouse will be used to demonstrate effects of changed climate condition on soils and plants. Size of the part (Part 1) is 167 sqm (18 m x 9,3m). This part of greenhouse will be used for educative purposes for students and visitors of the natural life park to awareness on climate chancing. Greenhouse 2: Second part of the greenhouse will be demonstrated parabolic solar heating system and also use of solar energy for lightening. Size of this part also is 216 sqm (18m x 12m).

Greenhouse 3: The rest part of the greenhouse will be used for demonstrating other new techniques for agricultural production considering energy and water saving and having much more production per unit area. Within this unit, vertical agricultural production, water harvesting from condensed vapor and hydroponic farming were planned. Beside them, a rain water harvesting system will be constructed on the roof of greenhouse.



plan view of greenhouses



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#### Final View of Climate Smart Greenhouses





#### Final View of Climate Smart Greenhouses





#### 1. IAc9- Development of Smart Soils from Mud Plant

The sewage sludge will be used in the experiment will take from the Çiğli Wastewater Treatment Plant of IMM, stabilized in anaerobic conditions and converted to granules of 90% dryness. Soil plots will be either unamended (SSO) or amended with SS at rate of 30 t ha-1 on a dry weight basis. The application of sewage sludge will improve the physical and chemical characteristics of the soil, and generally support microbial growth and activity. Depending on the application doses of the treated sewage sludge; a) 1% of the organic carbon content of the experimental soil; b) 10-50% of microbial activity and c) 5% of energy yield, are expected to increase.



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### IAc9- Improving overall Efficiency of urban waste water treatment by using by-products

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#### Final view of Mud Plant



#### IAc12- Green fences

Green fences or walls are installed alongside the Peynircioğlu Stream to allow development of new green areas and hence rising bio-diversity since the existing Stream corridor is now mostly an open space with little or no vegetation and fenced with a metal enclosure on both sites. Existing enclosure will be replaced with green fences or walls to provide more attractive environment both for people and pollinating insects.

Expected impacts:

a) Increased biodiversity,

b) More carbon sequestration and storage and pollutant's removal,
c) Some co-benefits including microclimate regulation through shading and transpiration, habitat for urban wildlife, and recreational services, such as growing grapes, which are typical cultural value of Mediterranean culture of agriculture.



#### IAc12-Green fences (1.6 km lenght)





#### IAc13-Establishment of fruit walls





#### Final View of Fruit Walls





#### Final View of Fruit Walls



### THANK YOU...