



Providing visibility to the urban ecosystem services of a territory: economic analysis of urban forests and green spaces

Framework of the research project SEMEUR

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INRAE

PARIS
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L'ÉCOLE SUPÉRIEURE DES
PROFESSIONS IMMOBILIÈRES

The logo consists of a stylized green tree on the left and a black building icon on the right, both positioned above the word "SEMEUR" in a bold, black, sans-serif font. The letter "E" in "SEMEUR" is replaced by a small square containing the letters "M" and "E".

Infrastructure impacts on biodiversity and ecosystem services

- The construction and operation of gray infrastructure (including buildings, transportation and power generation infrastructure) can have direct and indirect impacts on biodiversity and ecosystem services (UN Environment Programme, 2021).

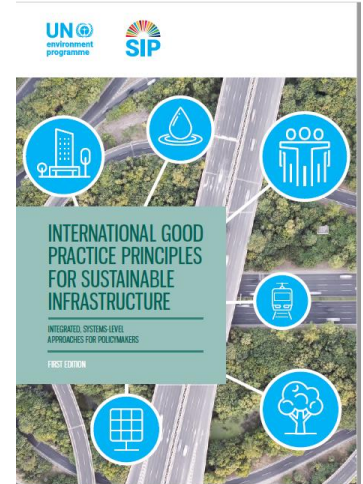
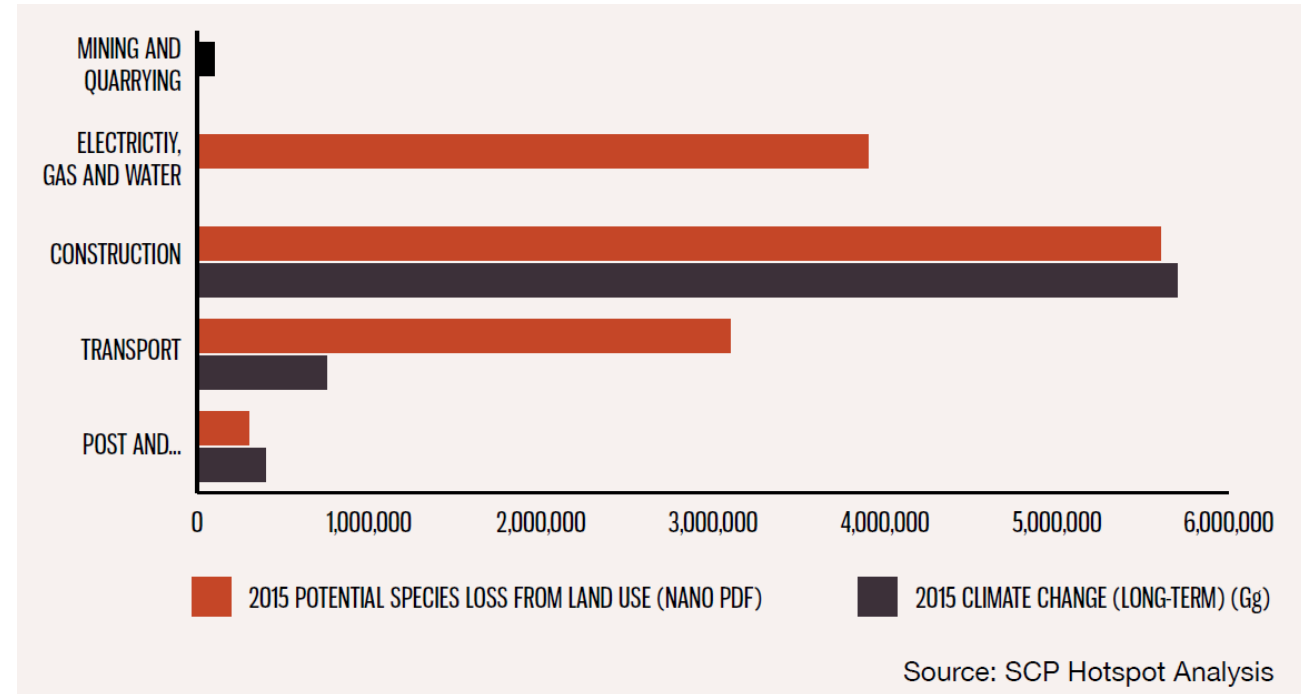
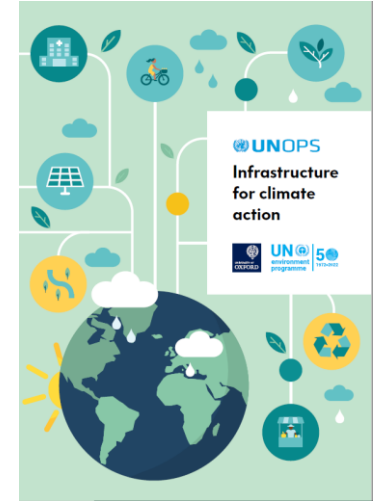
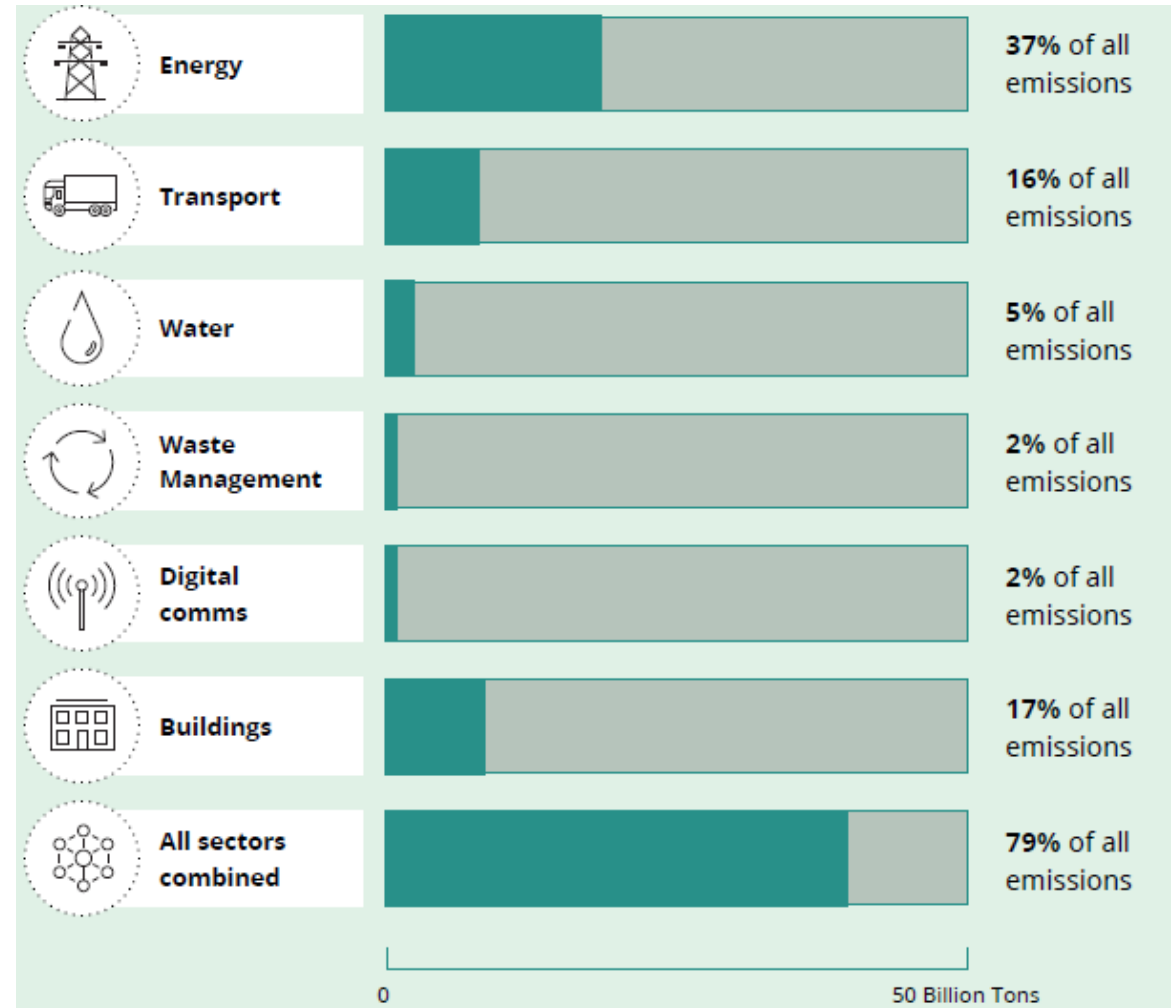


Figure. Potential species loss and climate change.

Infrastructure for climate action

- Infrastructure represents 79% of total greenhouse gas emissions and accounts for 88% of all climate change adaptation costs (UNOPS, 2021).

Figure. Infrastructure sector contribution to total GHG emissions.



Infrastructure and biodiversity-climate action

- Nature-based solutions exist for most infrastructure adaptation measures (IPBES, 2021).
- To reduce heat island in cities:
 - Create green infrastructure.
 - Account for climate and biodiversity in urban planning.
 - Green roofs

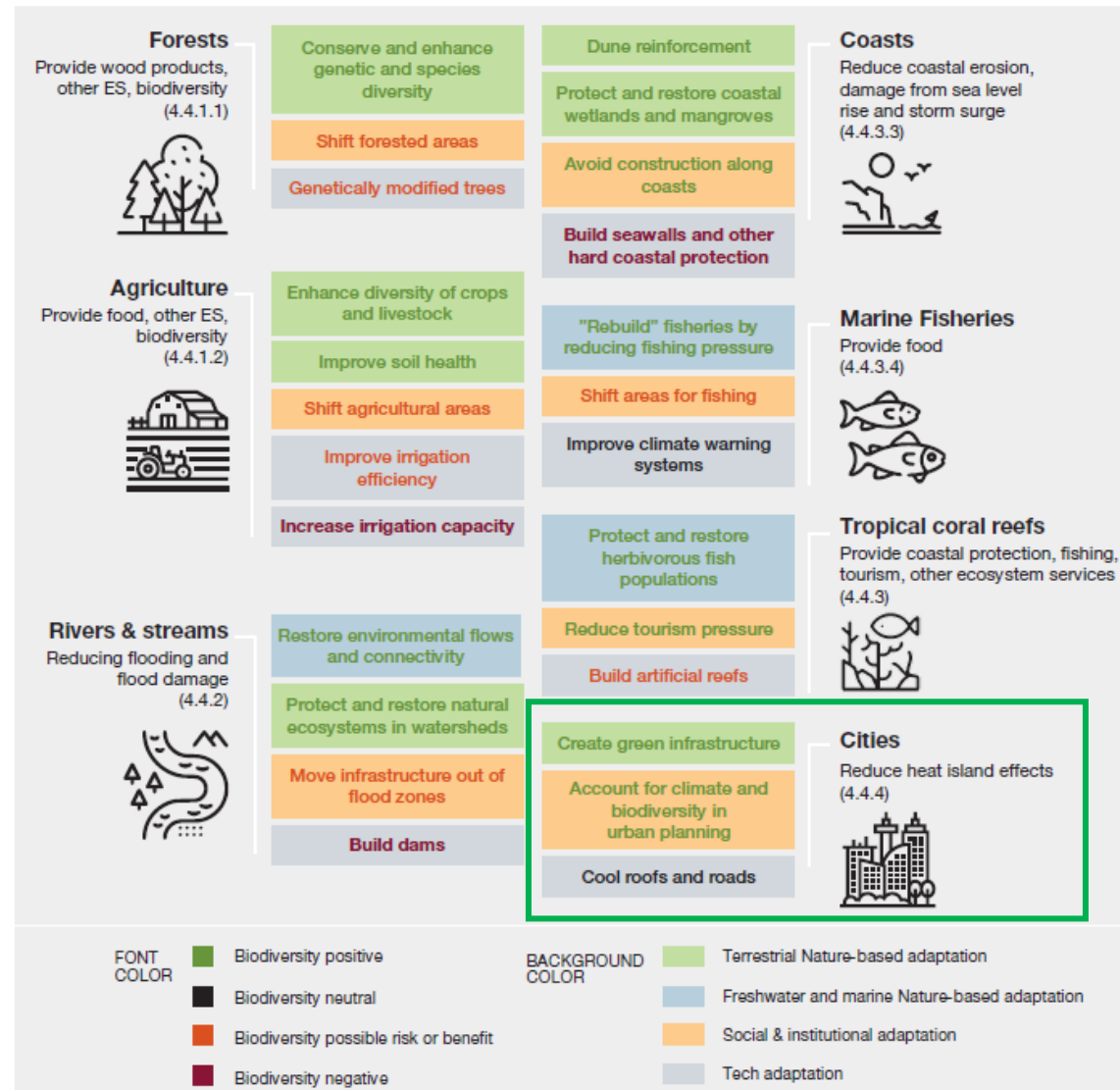
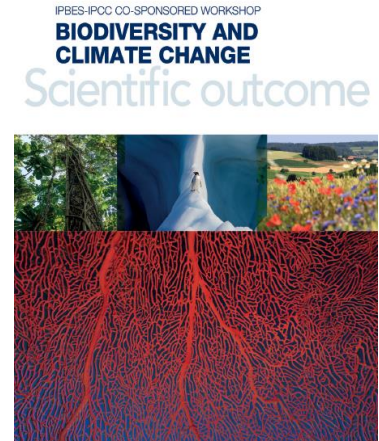
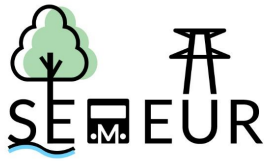


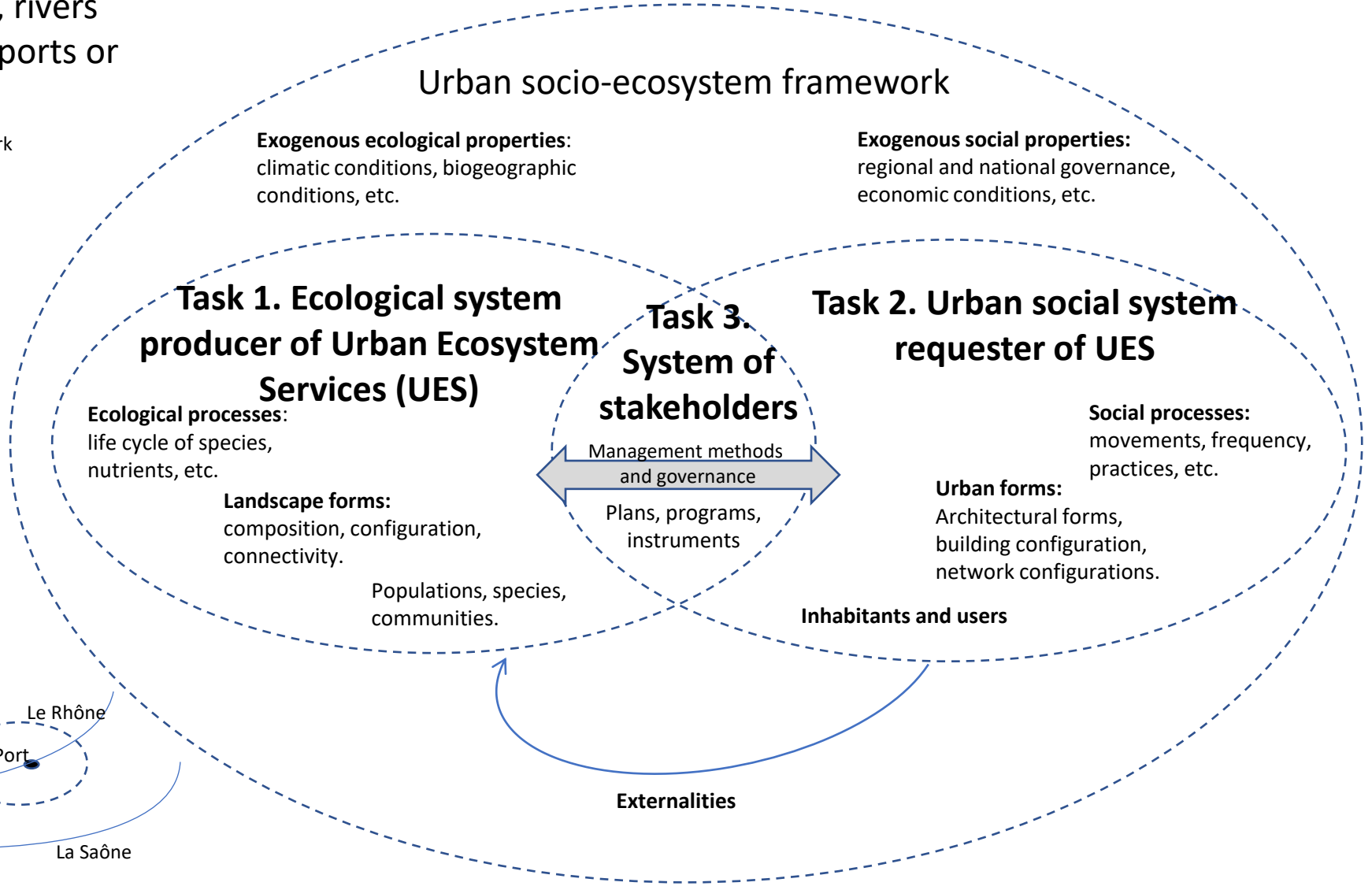
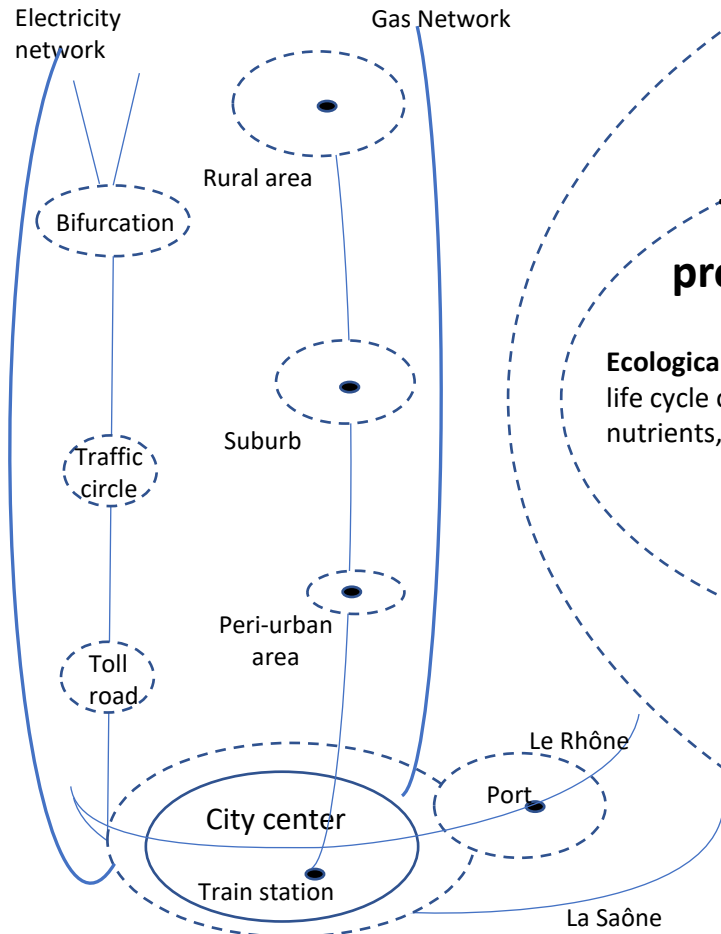
Figure. Examples of adaptation measures.



Urban and artificial socio-ecosystem



Linear transport infrastructure and rights-of-way: rail, roads, rivers and interfaces, stations, ports or airports.



Source : ECOBIOSE (2020), FRUGALITE (2021), adapted from Chapin et al., 2009.

Urban and artificial socio-ecosystem

Ecosystem services of tree areas, green spaces and urban forest:

- Air filtration
- Regulation of microclimate at street and city level
- Noise reduction
- Draining rainwater
- Wastewater treatment
- Recreational and cultural services

**Task 1. Ecological system
producer of UES**

Biophysical methods

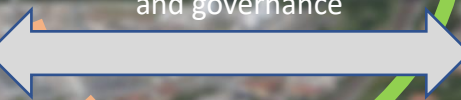
**Task 2. Urban social system
requester of UES**

Economic methods

- Contribution from residents and users
- Land use
- Who will pay ? Why ?
- Mechanisms to encourage

**Task 3.
System of stakeholders**

Management methods
and governance



Externalities caused by social
processes, urban forms, users





Making visible the urban ecosystem services of a territory



Contribution of transport infrastructure to an urban renaturation project



Rue Léon Gambetta
SAINT-FONS



Rue Léon Gambetta
SAINT-FONS

Objectives of the SEMEUR project

- To develop a methodology for assessing the demand for urban ecosystem services (UES) in an urban area.
- To evaluate the capacity of transport infrastructure to meet, in part, these demands through the ecological restoration of soils.
- To assess the capacity of a territory to support a renaturation project: technical, financial, regulatory and organizational means.

Method and site of experimentation

- **Evaluation of the ecological system producing UES**
- **Evaluation of the social system requesting UES**
- **Evaluation of the system of stakeholders**
- **Experimental site of Greater Lyon:** the commune of Saint-Fons (+ a buffer of 0.5 - 1 km) which presents
 - a deficit in urban trees,
 - a significant diversity of transport infrastructure : roads, freeways, railroads, navigable waterways, high-power lines and hydrocarbon transport pipelines,
 - social and air quality challenges.

Canopy Plan Saint-Fons

Reinforcing the
vegetal network in
the transport
infrastructure land



Task 1. Supply of UES

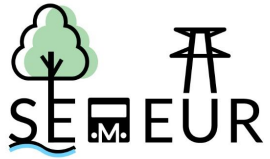
Research studies:

- Study of land use and its capacity to provide UES.
- Modeling of renaturation scenarios.

Expected results:

- Land use map with a typology based on the capacity to provide ecosystem services.
- Nominal value of ecosystem services for each land use type and references used.
- Scenarios for the evolution of these nominal values after ecological restoration operations.

Task 2. Demand of UES



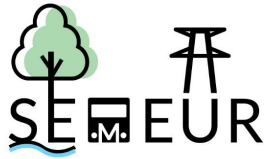
Research studies:

- Valuation of ecosystem services of a green urban landscape by transport infrastructure (tramway, roads, parks).
- Analysis method: Discrete Choice Experiment.

Expected results:

- Improvement of the experimental design method.
- Data collection either in face to face and web survey (Lyon metropolis and commune of Saint-Fons).
- Econometric analysis to reveal the preferences of the inhabitants/users of Lyon concerning the vegetation scenarios of the tramway T10, south extension project crossing the commune of Saint-Fons.

Task 3. System of stakeholders



Research studies :

- Study of the real estate market.
- Territorial diagnosis of the commune of Saint-Fons.

Analysis method : participation of students on real estate promotion, management and finance of the ESPI Lyon, business game.

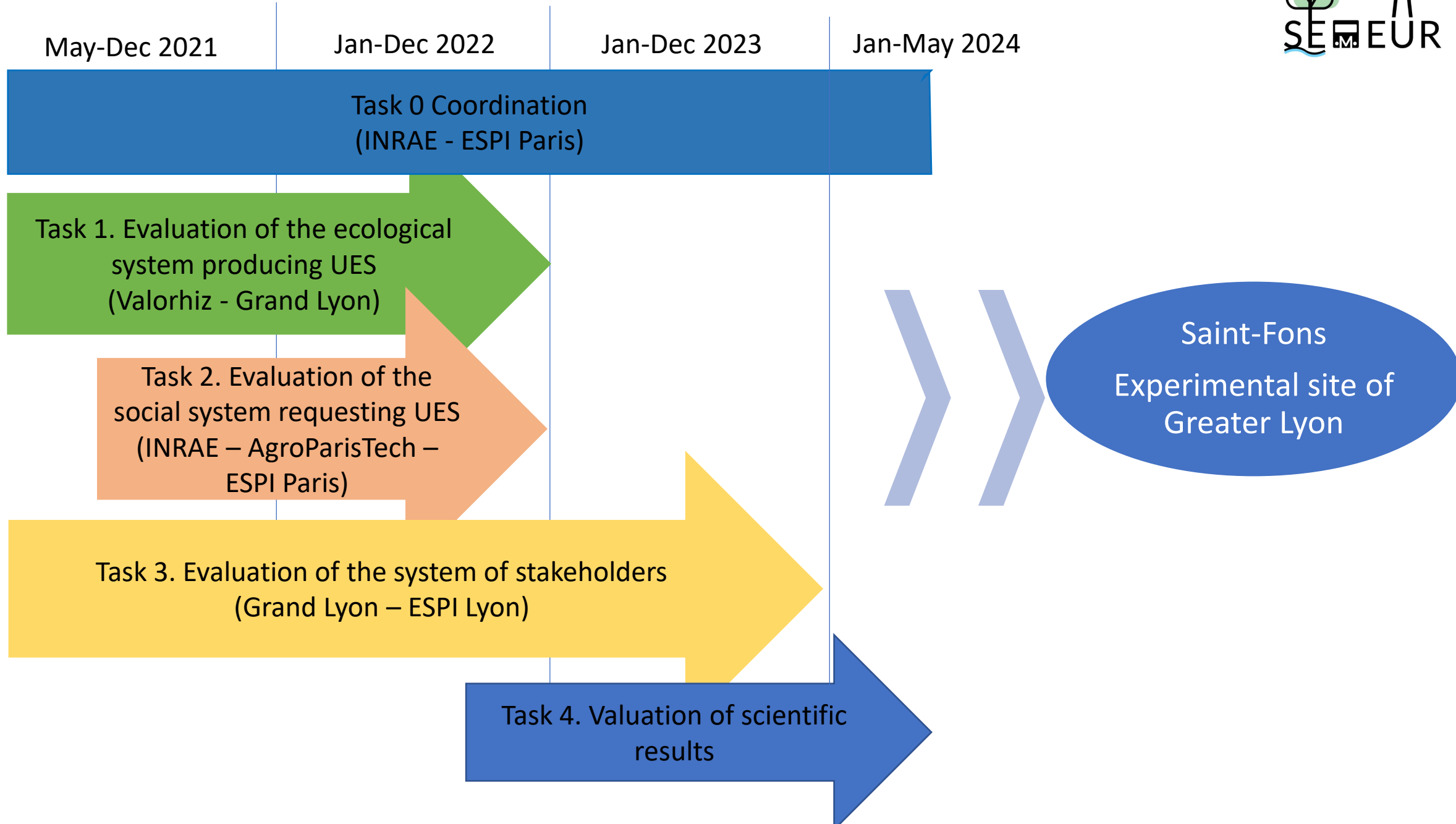
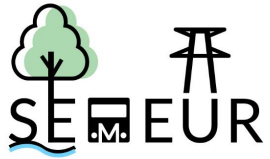
Expected results :

- Reporting to the stakeholders of Saint-Fons and Grand Lyon.
- White paper for real estate developers.

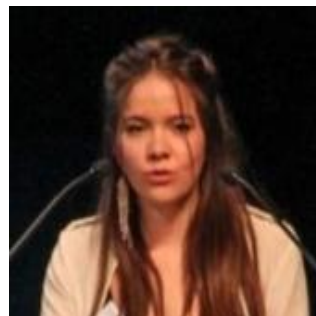
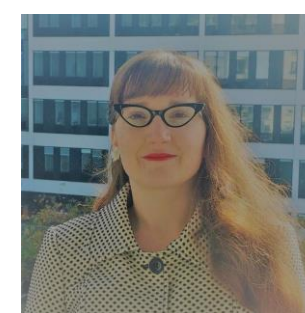
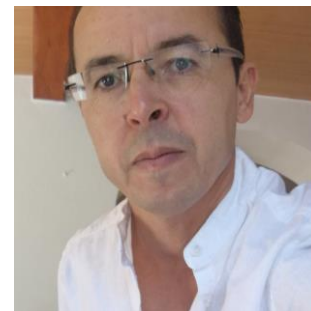
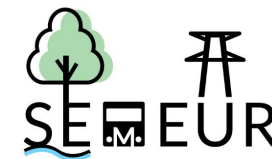
Task 4. Valuation of scientific results

- Project webpage: <https://semeur.hypotheses.org/>
- Reporting to stakeholders of Saint-Fons and the monitoring committee.
- Quarterly meetings of the task pilots.
- Annual inter-task workshop.
- Intermediate/final ADEME and ITTECOP restitution (deliverables, reports and oral presentations).
- Scientific publications, presentations at national and international conferences.
- Articles (e.g., Monitor, Conversation, ecological engineering journals).
- Mobilization of real estate sector (promoters/developers).

Planning of SEMEUR project 2021-2024



Semeurs - Sowers



SaintFons

