

Eco-EAR: méthode d'analyse économique des services rendus par le système de gestion des eaux urbaines

Eco-EAR: method for economic analysis of delivered services by urban water system

Introduction

We have developed a methodology that allows:

- Explaining the costs of an urban water management system: these concerns the total cost of the service paid for. Costs can be broken down as a function of the activities that ensure the primary and secondary functions of the system, by identifying the associated assets and physical flows for each activity.
- Identifying the activities generating the highest costs: the goal of the owner is to obtain knowledge about costs impacting on activities, in order to optimize the processes of the system.
- Assess, by activity, the relationship between cost, activity and the service provided. This evaluation allows: i) formulating an indicator that offers new understanding of the system by tackling its economic and technical dimensions; and ii) benchmarking the same activity against several equivalent systems deployed in different territories.

Eco-EAR "Methodology"

Implementing the proposed "ECO-EAR" methodology (see Figure 1) is mainly based on the identification of the key activities that characterize the principal function of the urban water management system (UWMS). It consists in mapping the sub-systems and flows that characterize UWMS by highlighting links between the activities that distinguish the primary function of the system and the inherent costs. It is necessary to clearly distinguish asset elements from the organizations representing the entities which manage the system.

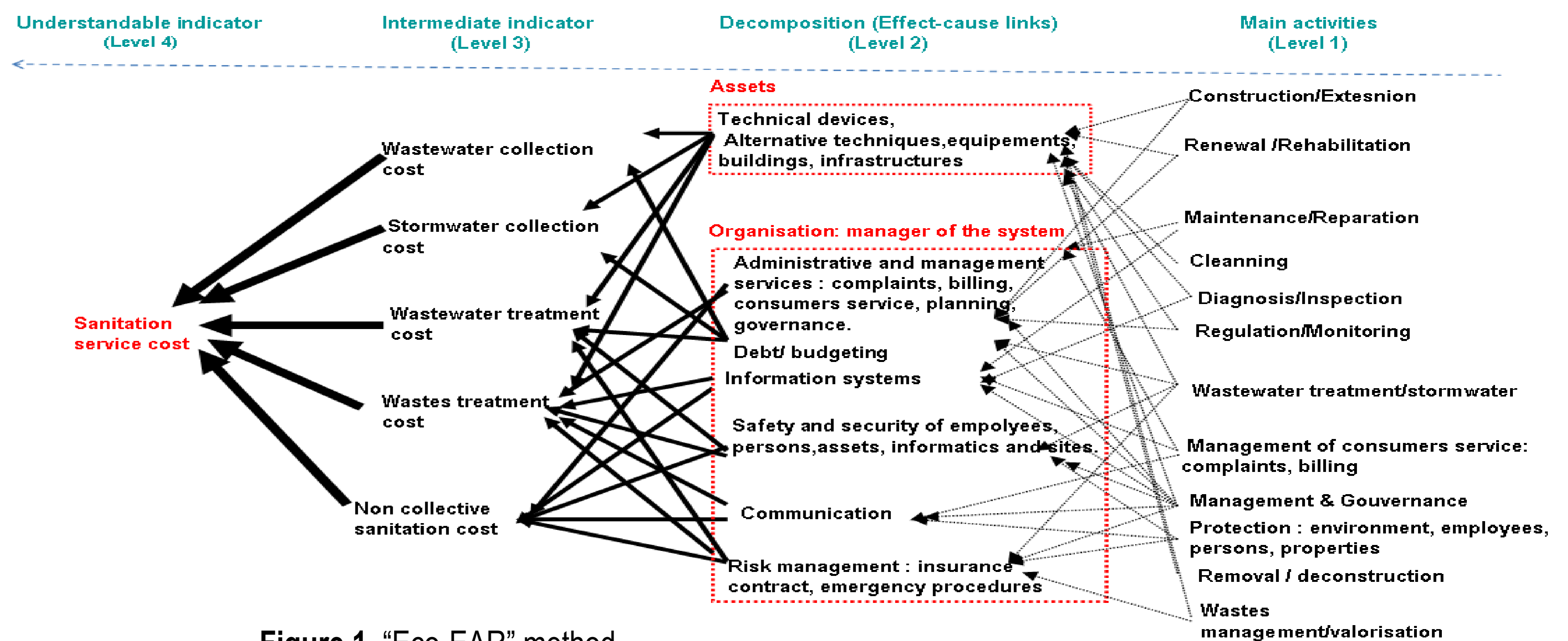


Figure 1. "Eco-EAR" method

Application

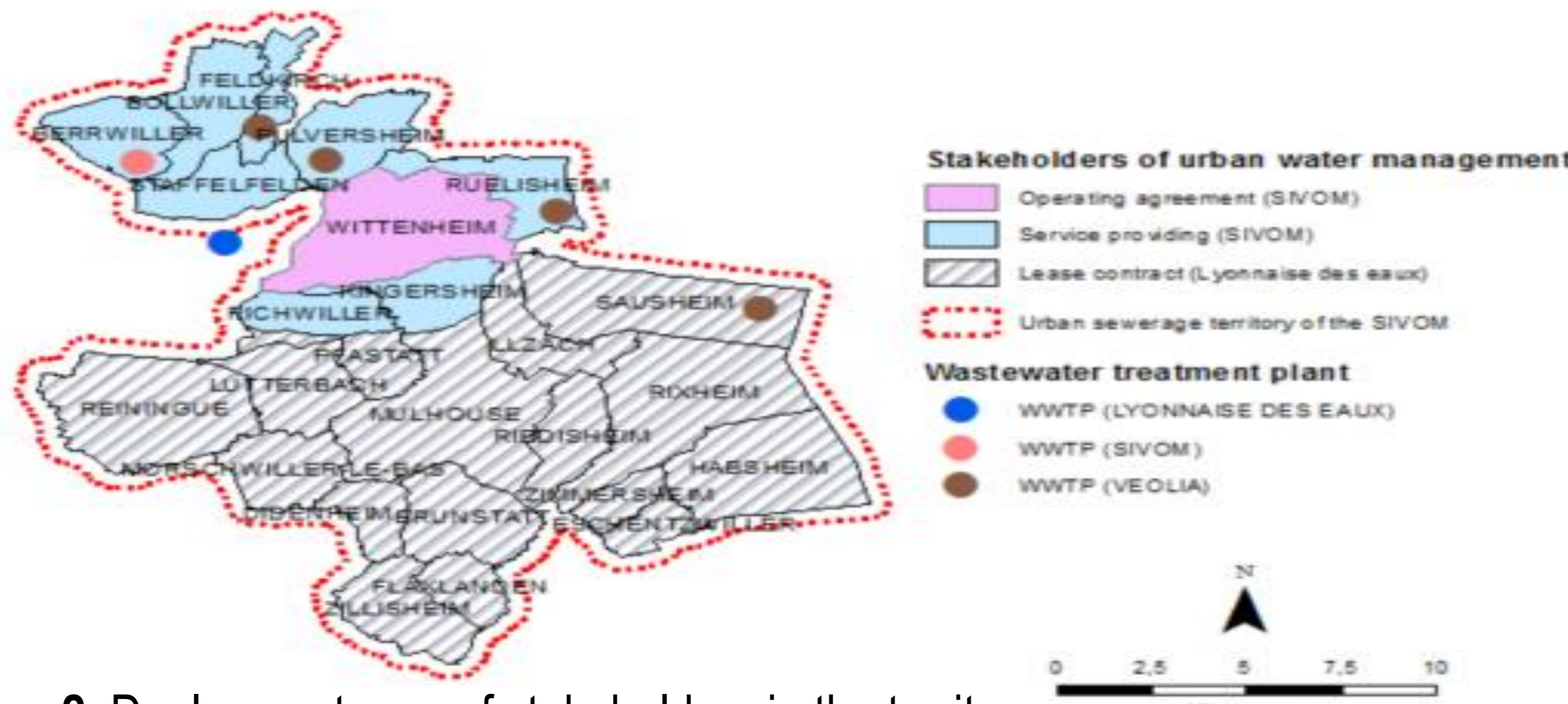


Figure 2. Deployment map of stakeholders in the territory

The purpose of the "Eco-EAR" method is to describe the composition of the direct cost of a sub-system of a UWMS by focusing on the sanitation service system in a specific territory, where i) several competencies are shared, and ii) several stakeholders coexist in order to ensure the level of service required. The organisations providing the services are: the SIVOM of the Mulhouse Region (the owner and manager in the sub-territory), the "Lyonnaise des Eaux, LdE" (network manager) and Veolia (wastewater treatment plant manager). The figure below shows the map of each stakeholder's deployment in the territory concerned

Results and Discussion

We used the "Ecoval@" mapping software for process evaluation. It enables establishing three types of system mapping: 1) physical flow mapping, 2) cost formation mapping, and 3) cost driver mapping. We illustrate below the implementation of "Eco-EAR" method by browsing through the four main levels of analysis for the "Cleaning" activity.

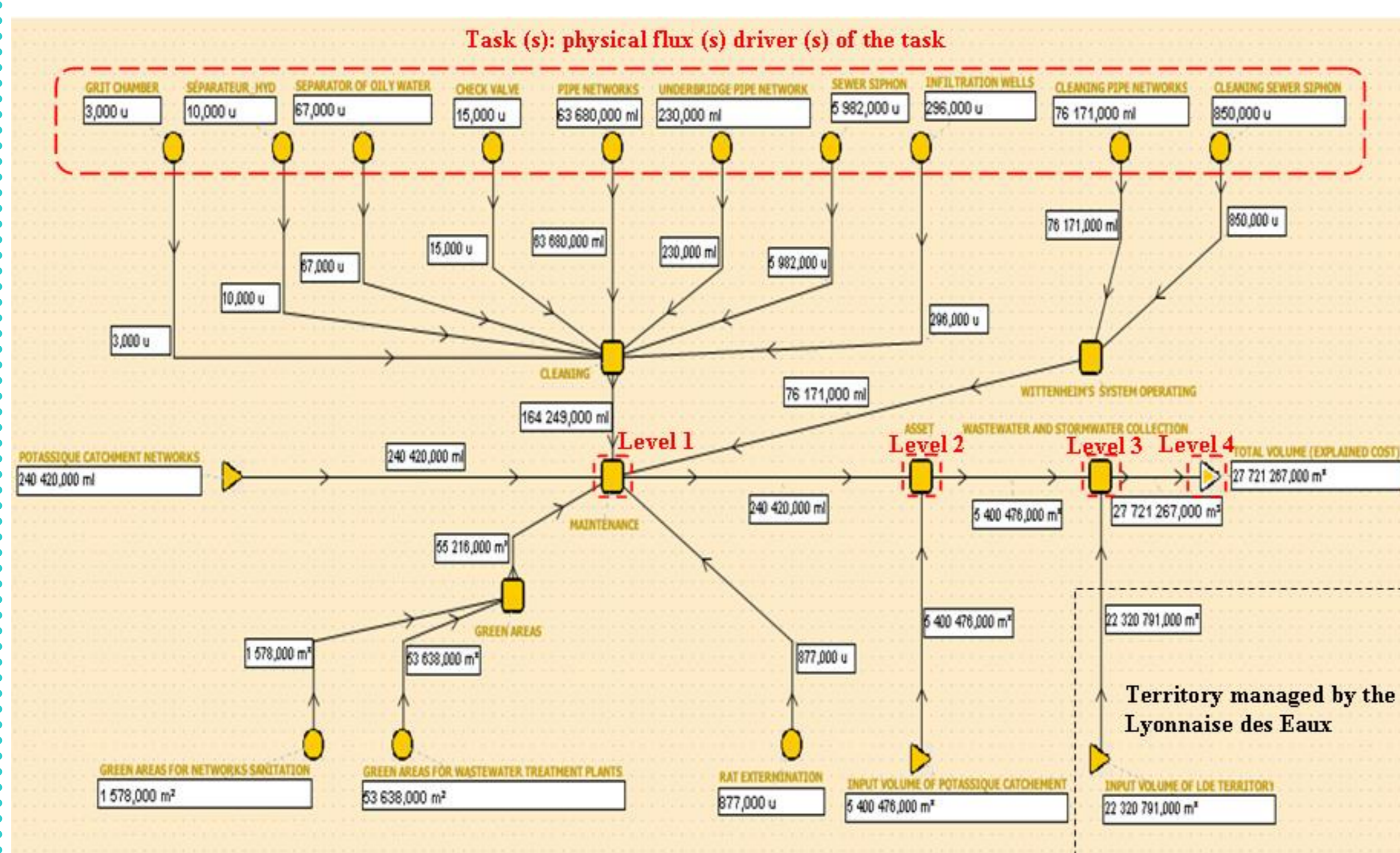


Figure 3. Physical flow mapping of the "Cleaning" activity

The table 1 shows the relevant results for some activities. This cost explains 93.2% of the annual average service cost (calculated on the basis of the mean service cost of 0.50 €/m³). Due to the coexistence of two main sub-territories, one managed by the SIVOM and the other by Lyonnaise des Eaux company, the method is applied exclusively to the first sub-territory. Therefore, if we assess the contribution of the territory selected to the total service cost of the entire system grouping both sub-territories, we can explain and track about 57% of annual expenditure. Calculating the contribution of each activity in the average service cost allows prioritising activities and identifying the most costly. In our case, the activities having the highest impact on the subsystem managed by the SIVOM are: the wastewater/ stormwater treatment activity (31.75%), followed by the waste management activity (10.89%).

Table 1. The results of indicators calculated on the basis of a reference flow corresponding to the volume characterising each territory.

Activities	Intermediate indicators (Level 3)	Contribution to the cost of sanitation service	Understandable indicator (Level 4)	Mean cost		Contribution	
				Outside Lyonnaise des Eaux territory	SIVOM and Lyonnaise des Eaux	Outside Lyonnaise des Eaux territory	SIVOM and Lyonnaise des Eaux
Renewal/Rehabilitation/Building/extension	0.056 €/m³ *	6.81%	0.466 €/m³	0.50€/m³	0.822€/m³	93.2 %	57 %
Cleaning	0.03€/m³ **	3,65%					
Maintenance/repairs	0.0044€/m³ **	0,54%					
Diagnosis/ Inspection	0.0056 €/m³ **	0,68%					
Treatment: waste water /stormwater	0.261€/m³ *	31,75%					
Waste management	0.0895 €/m³ *	10,89%					
Personnel management	0.019 €/m³ *	2,31%					

* Sub-territory managed by "Lyonnaise des Eaux, LdE"
** Sub-territory managed by the SIVOM

Conclusion

The "Eco-EAR" methodology is innovative as it improves the description of the "water system", in our case the sewerage system, by combining its technical and economic dimensions. The goals are to highlight the cost structure and possible dysfunctions in the operation of the system that may be possible sources of additional cost that have to be reduced. Besides providing an economic assessment, our work focuses on the sustainability of the sewerage system and its capacity to maintain the required level of service. The results obtained are encouraging. Also, in spite of the difficulties of collecting data and information, it was possible to establish the interaction between the system's functions, activities and technical facilities, albeit partially. The understandable indicators were also evaluated. However, some improvements are needed to implement the method. Although "Eco-EAR" provided a good description of the cost of the sewerage service provided, it focused on the direct cost. This leads to the question of whether an assessed cost of sewerage is acceptable for the stakeholders. Is there a threshold of acceptability or rejection?

Amir NAFI¹, Younes BENTARZI¹, Damien GRANGER^{2, 3} and Frederic CHERQUI^{4, 5}.

- Unité Mixte de Recherche Gestion territoriale de l'Eau et de l'Environnement (GESTE) IRSTEA-ENGEES, 1 quai Koch 67070 Strasbourg Cedex, France.
- Lyonnaise des Eaux, Agence Haut-Rhin, 17 rue Guy de Place – BP 68802 Thann Cedex, France.
- LyRE, centre de recherche de Lyonnaise des Eaux Bordeaux, domaine du Haut-Carré, Bâtiment C4, 2nd étage, aile gauche - 33400 Talence, France.
- Université Lyon 1, LGCIE, 69622, Villeurbanne, France.
- Université de Lyon, 69361, Lyon, France.

