

Title/Heading: Zone Libellule®: a nature-based wastewater treatment technique leveraging the self-purification capacity of wetlands

i. Context and rationale

While the presence of micropollutants in water is now well admitted in the scientific community, the European Union has prescribed member states to eliminate them from water resources within the next 20 years. Currently, only between 30 and 80% of micro-pollutant flows are stopped by wastewater treatment facilities. Whilst standard absorption treatment methods provide a viable solution to reach this goal, other options are available. Among them, we can mention the Artificial Wet Zones (AWT), which strengthen the self-purification capacity of natural ecosystems to treat wastewater.

ii. An overview of the contribution

SUEZ has developed a new wetland concept known as the “Zone Libellule®” (literally meaning “Dragonfly Zones”), which is at the forefront of wetland conservation and restoration. It is a nature-based solution developed by SUEZ that, in the same way as AWTs, strengthens the treatment capabilities of the natural environment thanks to bio-based filtration. In addition to its purification role, it helps the local environment to restore biodiversity while ensuring a more refined water treatment.

SUEZ’s scientific teams have conducted a thorough experimentation to analyze the sewage treatment performances of different types of wetlands. The study of several parameters (ex: design, climate, presence of flora, water flows, purification time) has shown a great variability in performances which has been used by SUEZ’s teams to identify patents. Based on this experimentation, parameters of wetlands can be fine-tuned by combining several biodiversity layers with distinctive properties.

iii. How the contribution leverages living natural systems as a solution to avert climate change?

This nature-based solution permits to tackle biodiversity erosion by restoring/rehabilitating existing wetlands and/or by designing new ones, while capturing carbon emissions through revegetation. It can also contribute to reducing water scarcity that may arise from climate change, by facilitating direct or indirect wastewater reuse after treatment.

iv. How might the contribution support both climate, mitigation and adaptation as well as other important co-benefits and social, economic and environmental outcomes in coming years including

a. Reduction in carbon emission and carbon capture (GTonnes)

“Zones Libellule®” also act as natural carbon sinks that mitigate greenhouse gases emissions. Indeed, the development of flora in such areas leads to carbon capture at a larger scale than many other types of soil: freshwater wetlands can sequester between 20 to 40 times more carbon than forests on dry land (*Dr Paul Carnell, researcher from the Deakin University School of Life and Environmental Sciences’ Blue Carbon Lab*). The amount of CO₂ tonnes captured depends on the type of flora and the size of the “Zones Libellule®”.

The natural treatment of micropollutants also avoid the use of additional mechanical or chemical treatments, which are energy intensive and thus produce carbon emissions.

b. Increasing climate resilience

Facing the likely increase in the number and gravity of extreme climate events in the coming years, the restoration of “Zones Libellule®” can contribute to improving climate change resilience. On the one hand, wetlands are buffer zones as they permit to reduce floods intensity and the damages they cause. On the other hand, the water accumulated during rainy years or extreme weather events will flow into groundwater tables and rivers during dry seasons and droughts.

c. Social impact (job increase; poverty reduction, etc.)

The implementation of “Zone Libellule®” results in landscape and water resources quality improvements that are highly valued by all local stakeholders. Fauna and plants dynamics also permit to develop a particularly rich educational and recreational biodiversity, for instance to raise awareness about wetlands and biodiversity losses.

d. Net economic impact (total in US\$; how was it achieved?)

On the economic side, “Zone Libellule®” can reduce the cost of wastewater treatment and can be easily replicated.

e. Impact on realization of the 2030 Agenda for Sustainable Development (in particular SDGs 1,2,6,12,13,14,15,16)

They contribute to improving drinking water access by reducing the diffusion of micropollutants in fresh or salt water sources, and they also contribute to increasing access to sanitation, as a complementary solution to standard treatment processes. Thus, “Zone Libellule®” are contributing to reaching SDG 6.

f. Minimising species extinction and ecological losses and fostering an increase of biodiversity.

Beyond being a water treatment solution, “Zone Libellule®” is a tool to tackle the biodiversity loss the world is facing. The protection of aquatic environments through nature-based solutions permits to avoid the standardization of natural habitats and to preserve the diversity of species. In fact, wetlands can be either restored, minimizing risk of fauna or flora extinction and ecological losses or either expanded, fostering an increase in biodiversity.

v. How have stakeholders (for example indigenous peoples, local communities, and youth) been consulted in developing the contribution?

The solution has been developed with several partners, both public and private: SUEZ through its branch Water France, Nymphaea, Rive, LERES EHESP, CITERES. More than 100 people were surveyed during the collaborative research period (politicians, technicians, local inhabitants...)

vi. Examples of experiences to date: how does this contribution build upon this experience? How does the contribution link with different ongoing initiatives?

The first “Zone Libellule®” project to be put into operations in 2009 at a municipal wastewater treatment plant – was developed in France, Saint-Just (Hérault). The main example is located in China where the first Zone Libellule has been designed for an industrial park: Shanghai Chemical Industry Park (SCIP), the largest petrochemical platform in Asia. It consists in the rehabilitation of 13 hectares and its extension with 23 more hectares. This example links the “Zone Libellule®” with the circular

economy as it allows the re-use of wastewater and promotes the generation of renewable energy from solar panels and wind turbines, enabling the “Zone Libellule®” to be self-sufficient in energy.

vii. How the contribution will be delivered? How will different stakeholders be engaged in its implementation? What are the potential transformational impacts?

The socio-territorial aspect is taken into account from the beginning of each project. There is a precise methodology that can be adapted to each local context: preliminary study, feasibility study, design study and monitoring. The first three parts of this methodology consist mainly in stakeholder dialogues leading to social, institutional and landscape recommendations. Indeed, the “Zone Libellule®” solution is modular and can be adapted to each local context worldwide.

viii. Is this initiative contributing to other Climate Action Summit workstream (industry transition; energy transition; climate finance and carbon pricing; infrastructure, cities and local action; resilience and adaptation; youth and citizen mobilization; social and political drivers; mitigation strategy)?

Yes: industry transition, energy transition, infrastructures – cities and local action, resilience and adaptation, mitigation strategy.

ix. Means of stewardship, metrics for monitoring.

About the management of “Zone Libellule®”, scientific metrics have been developed to monitor the zone, leading to recommendations: a management strategy of the zone that is consistent with Agenda 21 and Water Development and Management guidelines is then issued.

x. Contact details of proponents (indicating the degree of commitment among the countries and organizations that are named).

SUEZ

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Sections not answered :

- i. How might the contribution support both climate, mitigation and adaptation as well as other important co-benefits and social, economic and environmental outcomes in coming years including
 - a. Just transition
 - b. Food security
- ii. Which countries and organisations are involved in the contribution?
- iii. Where the contribution can be put into action?
- iv. Mechanisms for funding (with specific emphasis on potential for partnerships).
- v. Communication strategy.