

## **Riverine Biomass as Ecosystem Service for Low Carbon Urban Development**

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The western parts of the Netherlands are dominated by densely populated urban areas in the delta of three major rivers. These urban areas are vulnerable to peak discharges, which are predicted to occur more frequently due to climate change 1-3. One new approach to adapt to the increased flood risk is to allow river floodplains upstream of urban areas to inundate during peak discharges, reducing the water level further downstream. However, this requires constant management of floodplain vegetation to ensure sufficient discharge capacities. This gave rise to the idea of using biomass released during floodplain management as so-called ecosystem service, thereby providing a valuable resource.

In the upcoming bio-economy, biomass is in great demand as a sustainable resource for the production of renewable energy and bio-based products, thereby contributing to SDGs 7 (affordable and clean energy) and 12 (responsible consumption and production). However, land use issues and competition with food production limit the amount of biomass that can be produced sustainably in forests and on agricultural land, without constraining SDGs 2 (zero hunger) and 15 (life on land). This created a shift of interest towards residual biomass 4. Biomass from floodplains released during regular maintenance measures is therefore an interesting resource for a low-carbon bio-economy in urban delta areas.

This new idea brings together two different interests of Dutch river management organization: ensuring flood safety on the one hand and creating income on the other. The combination of conducting maintenance activities and at the same time harvesting biomass as ecosystem service seems to be a win-win situation.

Using residual biomass, is, however, not self-evidently sustainable 4,5. Various factors influence whether the exploitation of biomass as ecosystem services is sustainable and socially responsible. We argue that when governmental organizations pursue economic activities, they should at least comply with corporate social responsibility criteria, since in this case they act as a corporate entity. Moreover, it could be argued that they should go further than corporations in making sure their actions are beneficial in regards to sustainability and social responsibility. This is where science, policy and implementation must come together to ensure a sustainable use of biomass as a natural resource: the positive and negative effects of biomass use should be determined scientifically, principles for responsible use should be imposed by policy, and governmental organizations should implement river management considering both the scientific findings and their social responsibilities.

The goal of this study is to facilitate governmental organizations in achieving this balancing act through:

- determining which principles governmental organizations should apply when considering the use of biomass as ecosystem service.
- analysing the current practice of biomass utilization in river management regarding the consideration of these principles and giving advice if and how this can be improved in future projects.

To achieve the first objective, we will conduct a desk study on (corporate) social responsibility of governmental organizations regarding concepts such as ecosystem services, natural capital and building with nature. Considering biomass specifically, we will then formulate principles that should be applied by governmental organizations. To achieve the second objective, we will analyse Dutch river management projects of the last 10 years that include biomass utilization. We will review objectives, decision criteria, final agreements and realizations of these projects, analysing whether, how, and why principles of sustainability and social responsibility have been taken into account. We will gather empirical data via project documentation, questionnaires, and structured interviews.

In our poster presentation, we will first present the identified principles and subsequently highlight the most outstanding results regarding biomass utilization in current Dutch river management projects. Finally, we will give recommendations for future projects.

## References

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