Report

STORMsession River Litter

STORMsession	17 September 2020
Interviews	8 & 9 June 2020

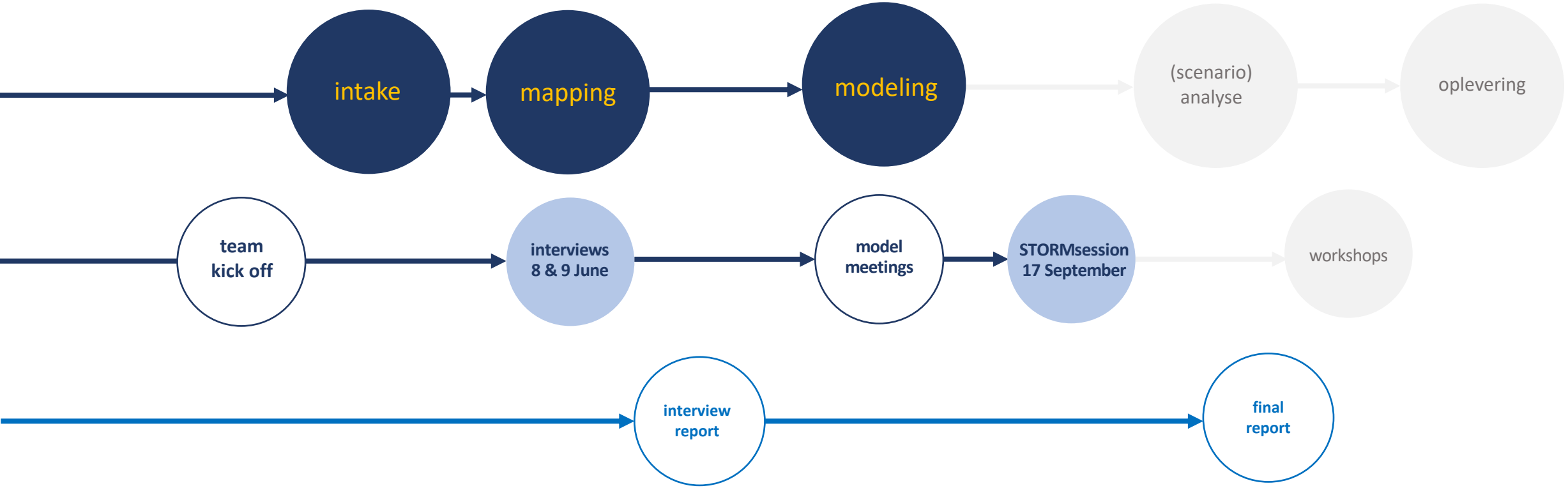
Contents

1. Preface

- **EU INTERREG LIVES project: Reducing plastic waste in the river Meuse**
- **Objectives STORM**
  - Strengthen links between partners
  - Gain clarity on system boundaries and project objectives
  - Example: "*The scope of LIVES is to focus at waste collectors*" versus "*consumers and producers also contribute to the prevention of littering*"

2. Proces & approach

The Projectflow of STORM Zwerfafval



Internal meeting

external meeting

possible continuation of the project

3. Mapping

System Boundaries

River Meuse within Eurregio

- River
- Banks
- Tributaries (inflow of waste)

Litter

- In water (visible and catchable > macroplastic)
- On banks/ flood plains (well known)
- On land (in the catchment area)

Hotspots

- Schools
- Water mills (16 in Geul)
- Weirs in the Meuse

Objectives

- Reduction of plastic litter in Meuse
- Clean, attractive area for visitors
- Landscape and ecological quality
- Liveability
- Shift from cleaning up to source reduction

Stakeholders

- Municipalities and Waste authorities
- Water authorities
- Inhabitants
- Landscape managers/ nature organisations
- Litter producers:
- Industry
- Providers (horeca, shops)
- Consumers (recreation, boats, fishermen, but also farms, businesses close to water, schools)
- Universities

3. Mapping (2)

Measures

Technical

- Monitoring to identify source and extent of pollution
- Use existing infrastructure (weirs, mills, screens) to clean and monitor waste
- Litter traps
- Reduce waste inflow from tributaries
- Increase capacity of sewage system
- Biodegradables?

Social

- Awareness of the public: it is a local problem

Organisational

- Improve international cooperation
- Need for responsible authority (now there is a void/lack of ownership; also at the general public)
- Financial measures (e.g. NEDVANG)
- Better exchange of knowledge and data across LIVES partners

External Factors

- Need for international cooperation between regional and national water authorities
- Cooperation with municipalities in awareness raising and monitoring (proposal by VMM)
- Wallonia ('RWS' equivalent) not in LIVES
- Coherent Legislation for litter at different levels:
  - European
  - National
  - Local for enforcement (handhaving)

Knowledge gaps

General

- Monitoring techniques
- Behaviour of litter in the river

Meuse

- Reference/ Litter flux (including time plastic is in the system)
- Inflow of waste from tributaries
- Role of floods (litter exchange with flood plain)

Organisational/ Social

- How to improve (cross-boundary) cooperation?
- How to influence behaviour (study by RWS)
- Norms for legislation; to get norms, need monitoring

Modelling the system

Introduction and System boundaries

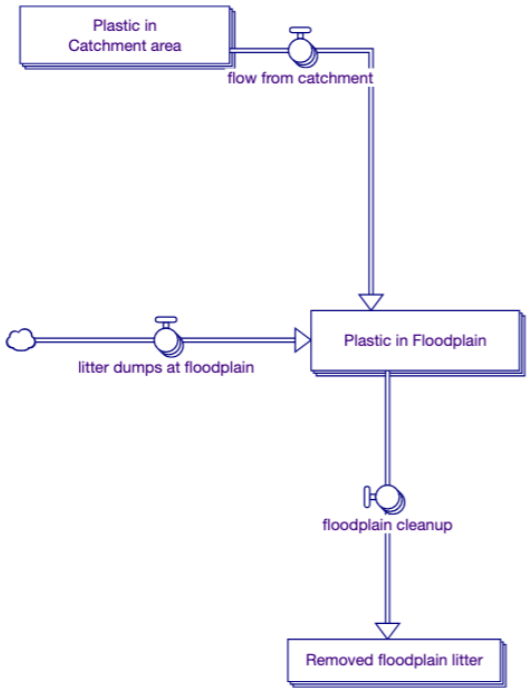
Startingpoint of the system/ this model are the plastics in the floodplain. You can also start by looking at where the plastics *comes from*, the 'beginning' of the plastic, like: producers, distributors and consumers. There is also a connection with the floodsystem itself, from plastics in hotspots (from where it can be removed), to litter getting down to the North Sea. This is an interactive system. Another way of looking at the plastics is from the degradation side into microplastics. What happens with the plastic once it is taken out? Is it recycled or not?

Important question with this model: **what do we want to include in the system? Do we want to know what is actually happening in the flows, in order to find effective measures and policies?** The system boundary can be the tool to start the discussion.

Comments

- *Sylvia: what are the boundaries in the system, are there also country borders?*
  Yes, there are borders, although not visible in this view of the model. You might be able to see them in the incoming flows, they are cross borders.
- *Lea: is this model a summary of the session before? And what type of data is included: pieces of plastic or lumbs, or materials?*
  There is no choice in this model. This is the reflection of the gathered data. This is an overview of the system.
  Types of waste (and amounts) can be made available and can be seen in this model.
- *Ansje Lohr: is there a link possible to hydrodynamic models?*
  Yes, we can do that. If you want to have a deep insight in how the plastic moves *in* the river, then you can paste the hydromodel to this overview model.
- *Annelies: can you differentiate in plastic hotspots? Due of dumping or of the currents of the river, or the construction of the riverbanks, etc.?*
  There are two kinds of hotspots: on the landside and in the river itself (sludges etc.). You can connect geographical areas/ location in the model, but the model is too generic to really look at specific locations.
- *Sylvia: how do we define a hotspot?*
  In the model a hotspot is qualitative. But in the quantative model (of Plastic in Rivers) we looked at specific hotspots. The question for this project remains: what kind of hotspots do we want to take into account?
- *Dion: are there also hotspots in time?*

Plastics on land



What is visible and known

The most visible part of plastics in the Meuse river-system is plastic waste on land, in the catchment areas around the river and on the riverbanks. Those 'stocks' are filled by dumps and left-behinds and emptied by clean-up actions.

Interventions and actions

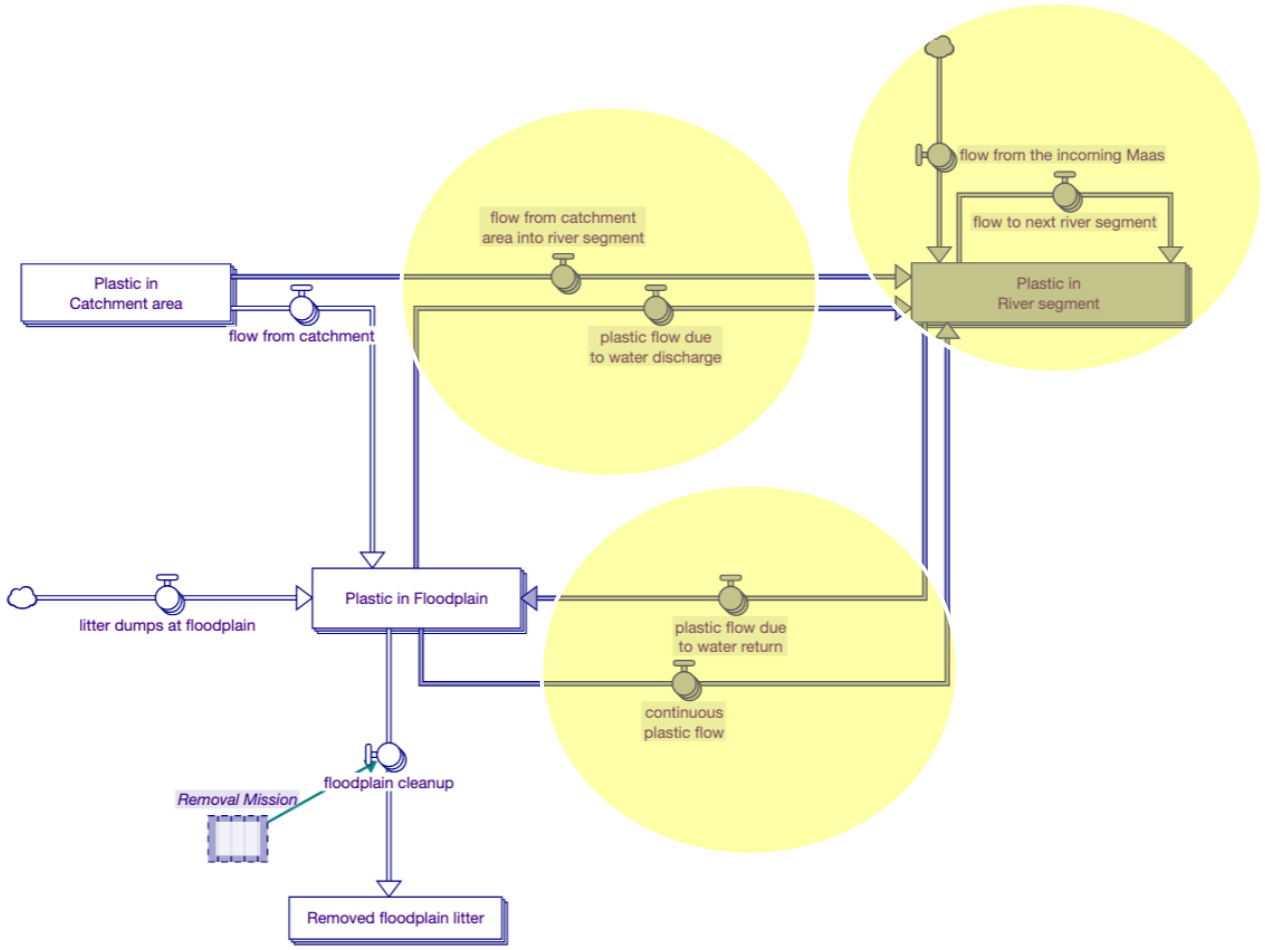
All the levels of plastic in the system can be influenced by interventions on the flows. In this part of the system we can think of changing

- *the inflow driven by human behavior of 'dumping' by communication or by reward and penalties*
- *the outflow by frequency of and subsidizing clean-up actions*

Monitoring

All the flows and stocks in the model are possible monitoring points to consider. We can monitor how much is flowing in, through and out, and we can monitor the levels of the stocks. From clean-up actions we know already a lot about the amount and composition of plastics on the river banks.

Inflowing plastics in the river



What is less known

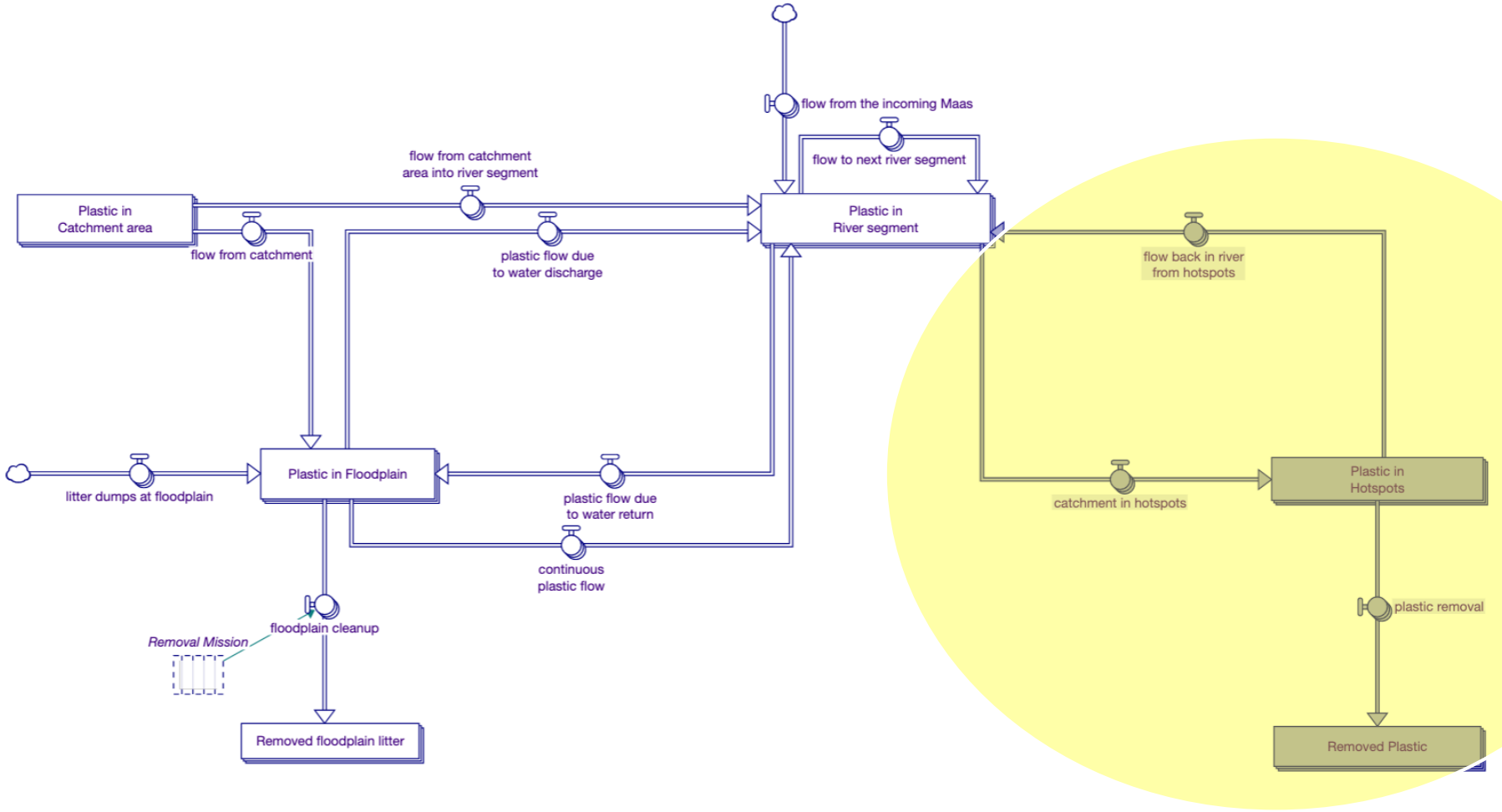
Relatively little is known about (the behaviour of) plastics in the river, in contrast with plastics on the river banks. To get a better understanding, we have to know how much flows in the river and exchanges with the river banks. There are three inflows to consider:

- *Direct inflow from the catchement area (by air or by small streams)*
- *Exchange with river banks, especially during high water periods*
- *Inflow from previous sections of the Meuse*

Recommendation

- *To extend knowledge start with some assumptions / estimates about the inflows and derive the level of plastics in the river segments from that, as long no real measurement data of the flows and levels is available.*
- *Meanwhile, start monitoring those flows.*
- *Special attention should be given to the exchange during high water periods, because this is a main driver of the movement of plastics in the system.*

Hotspots



Accumulation and removal

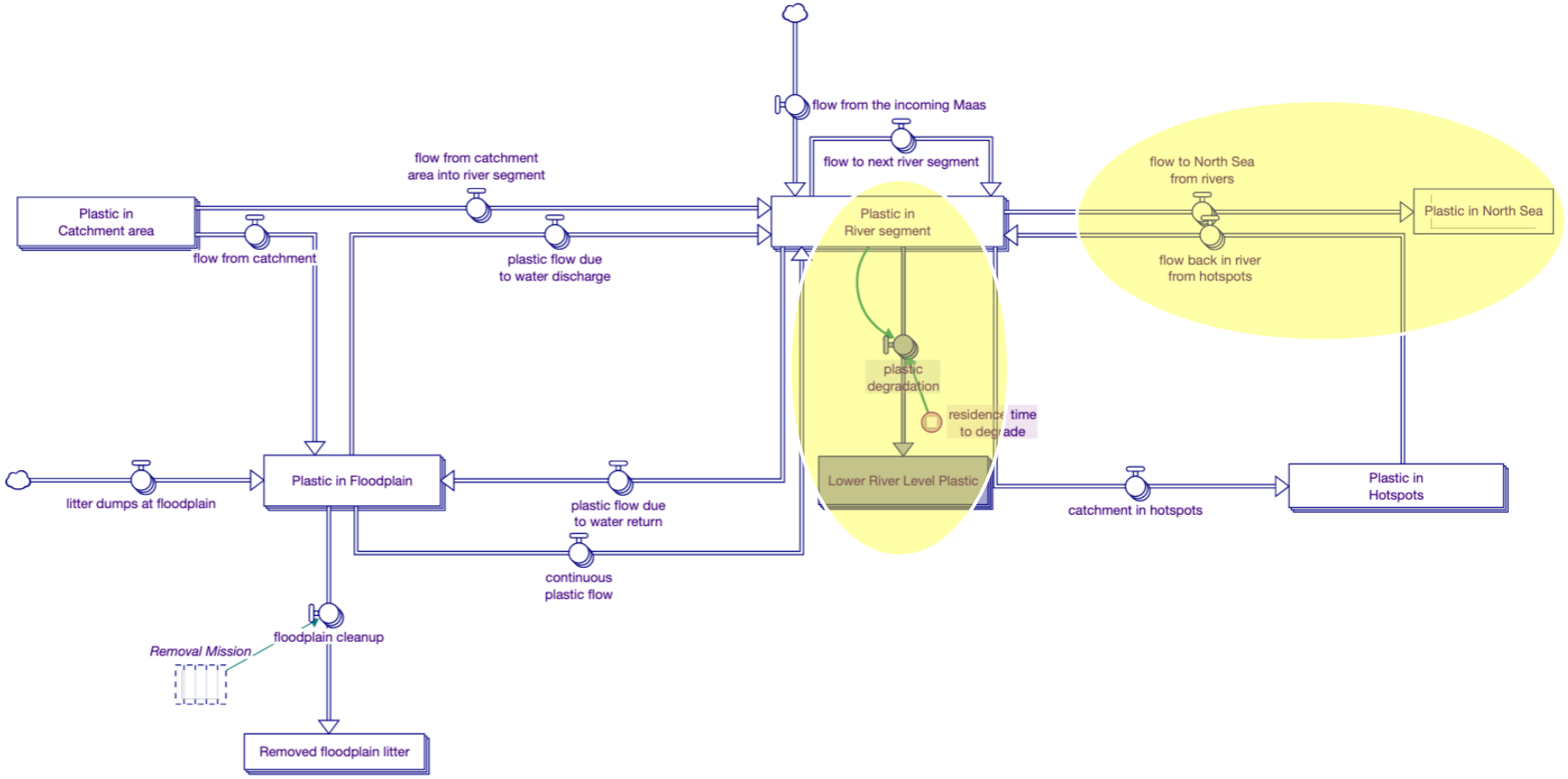
In the system (in all streams and the Meuse river itself) there are diverse hotspots: points where plastic accumulates because of an obstacle (it can not flow through).

River authorities are responsible for maintenance of those points and they delegate the maintenance work mostly to contractors. Contractors empty the hotspots periodically, but there are no arrangements about (standardized) ways of collecting information about what is removed in which amounts. This could give better insight in the behaviour of plastic in the river system, especially when it is combined with the inflow data in the model.

Recommendation

- *Make arrangements to exchange data of removed plastics of hotspots*
- *Standardize this data in line with the clean-up data of river banks*

Plastic ‘out of sight’



Environmental impact

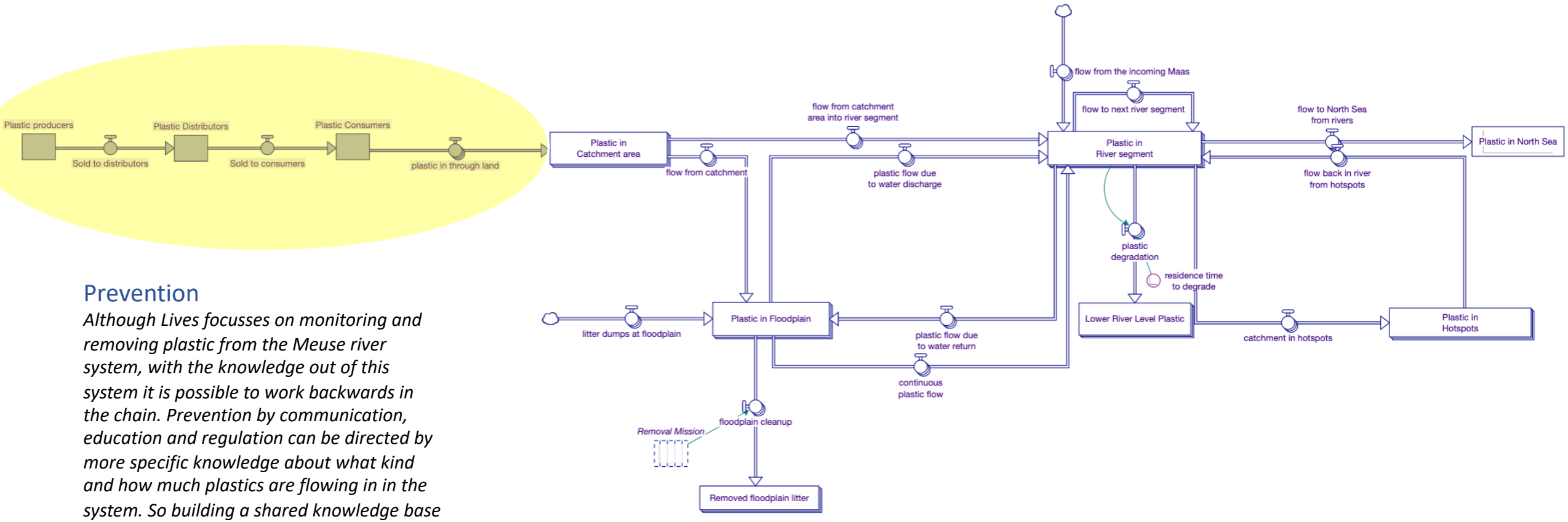
Degradation to micro-plastics and outflow to next sections of the Meuse outside the Euregio is not directly in scope of the Lives-project, but they are important indicators of the effectiveness of measures and actions taken in the river system in scope.

As less plastic degrades and less plastic is flowing to the sea, interventions contribute to the environmental impact.

Recommendation

Use the outflows (like flow to North Sea and degradation) as Key Performance Indicators of measures and actions taken in the system in scope. Start with estimates and improve this with monitoring data (possibly from other initiatives or research institutes).

Producers, distributors and consumers



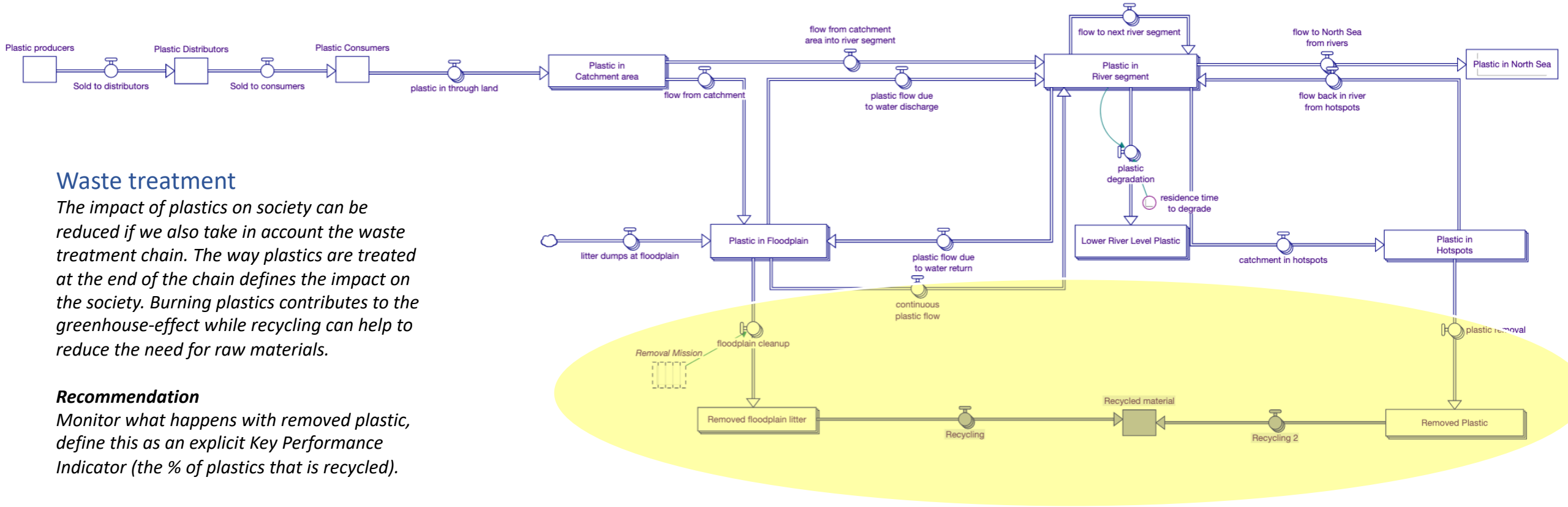
Prevention

Although Lives focusses on monitoring and removing plastic from the Meuse river system, with the knowledge out of this system it is possible to work backwards in the chain. Prevention by communication, education and regulation can be directed by more specific knowledge about what kind and how much plastics are flowing in in the system. So building a shared knowledge base helps to improve the effectiveness of prevention measures taken.

Recommendation

- *Build a shared knowledge base*
- *Organise a process to translate the knowledge in prevention measures*

Removal and recycling



Waste treatment

The impact of plastics on society can be reduced if we also take in account the waste treatment chain. The way plastics are treated at the end of the chain defines the impact on the society. Burning plastics contributes to the greenhouse-effect while recycling can help to reduce the need for raw materials.

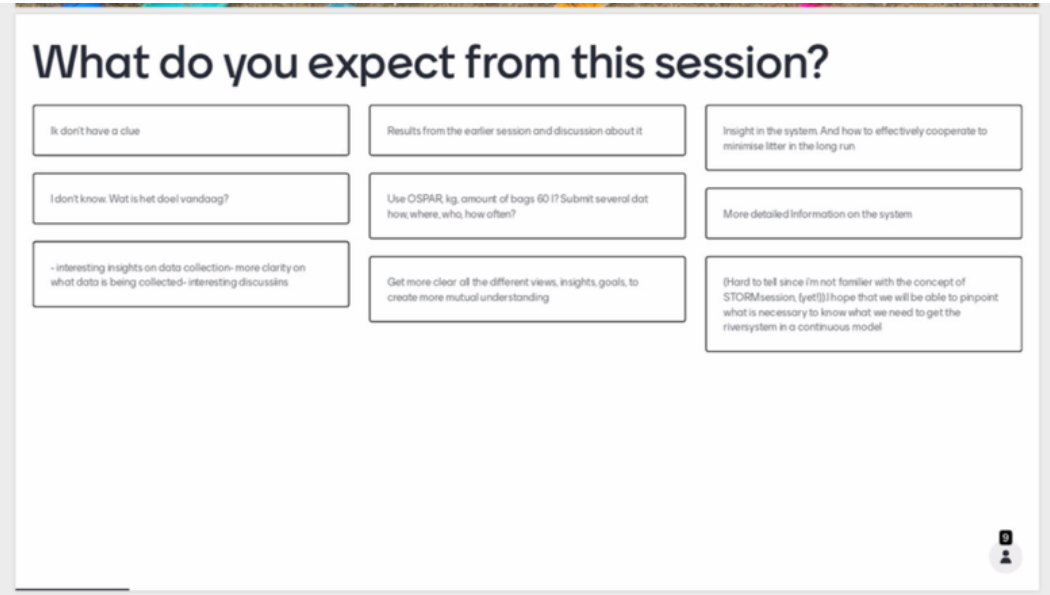
Recommendation

Monitor what happens with removed plastic, define this as an explicit Key Performance Indicator (the % of plastics that is recycled).

5. Findings

Findings from Mentimeter

What do you expect from this session and what is the most important objective of LIVES?

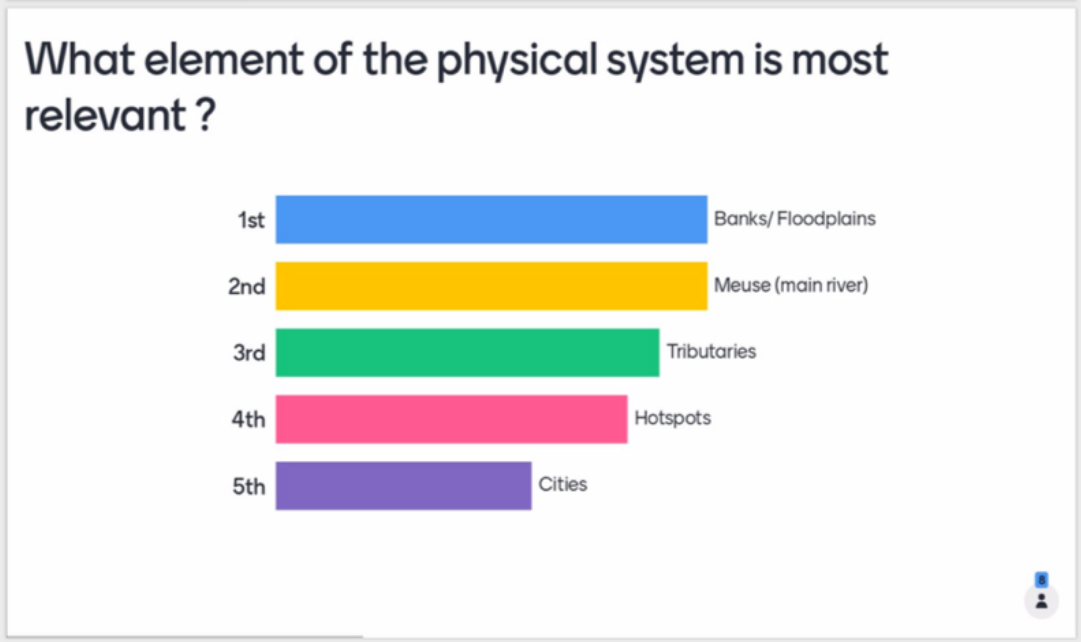


- I don’t have a clue
- I don’t now. Wat is het doel vandaag?
- Interesting insights on data collection. More clarity on what data is being collected. Interesting discussions
- Results from the earlier session and discussion about it
- Use OSPAR kg. amount of bags 60l.? Submiot several data, how, where, who, how often?
- Get more clear all the different views, insights, goals, to create more mutual understanding
- Insight in the system and how to effectively cooperate to minimise litter in the long run
- More detailed information on the system
- Hard to tell since I’m not familiar with the concept of STORMsession (yet!). I hope we will be able to pinpoint what is necessary to know what we need to get the riversystem in a continuous model

5. Findings

Findings from Mentimeter

What elements of the physical system and the waste chain are most relevant?



5. Continuation

What is needed to make the project successful and which next steps need to be taken?

- We need a tutorial about this model. Difficult for me to tell others. Long term: get data in the system for collaboration and then long term cooperation crossborder and with other Delta streams.
- I really don't know. I have not enough information what is already done and what is possible.
- Find out for what actions in LIVES this model is really helpful
- Share all data available even if not comparable. Create a regional platform to exchange data and knowledge. Make an agenda with priorities fort he next diverse years
- Make the model available; define next steps what to do with it; keep up all the good work we do now; look for continuation options; also make an inventory in LIVES of what things will continue or be implemented in national or regional plans
- Using the model as an illustration in meetings with other stakeholders to open eyes on the possibilities of cooperation?
- Come to crossborder agreements on cleanups, sensibilisation and enforcement. Exploring cooperation/ agreements on local and euregional levels
- Create strong networks and 'samenwerkingsverbanden'

6. Continuation

What is needed to make the project successful and which next steps need to be taken?

- *Short term:* feed the model, share data (on a regional platform), make a tutorial of the model. *Longer term:* create strong networks**,** define the next steps and think about continuation
- *Inventory of Lives: what has already been done in data collecting? Is there information on Who is doing What?* We need to do something with the data we have collected so far. Share all data available: is this possible now? How can we create tools to share data, also after Lives? We need to make a choice in what data to collect and how.
- *What will happen after Lives?* The question on how to continue needs to be answered, to prolong the cooperation. This project can be an example for other projects, for showing the complexity of the system and how to act. We need to look at all this in workpackage III. Lea will discuss with Eric.
- *Sylvia: on what should we focus? What is a suggestion to calibrate the system?* Start with the data you already have and line them up. You cannot do it all at once. Also make assumptions, until you get better data. Sometimes assumptions are the best we have. You can get them from experts or knowledge partners.
- *Dion:* Make a monitoring plan; get information from the people working on the riverbanks all the year round. Hire some people and get it done properly. All the information needs to come together. A tool for this: Literati (gives detailed information on found litter).

Wrap up & Follow up

- How will we continue? What is on the TO DO list?
- Scope should be defined better
- For a future after Lives we need funds to keep up this type of working and modeling. We need to upgrade the project and work together more on an individual level to get more depth into the model
- There is an eagerness to solve the problem with data, but there is also confusion: where to start? At what part of the problem? Who will take control in all of this?
- Upcoming website: www.litterfreeriversandstreams.eu

7. Appendix

Participants: interviews 8/9 June & session 17 September

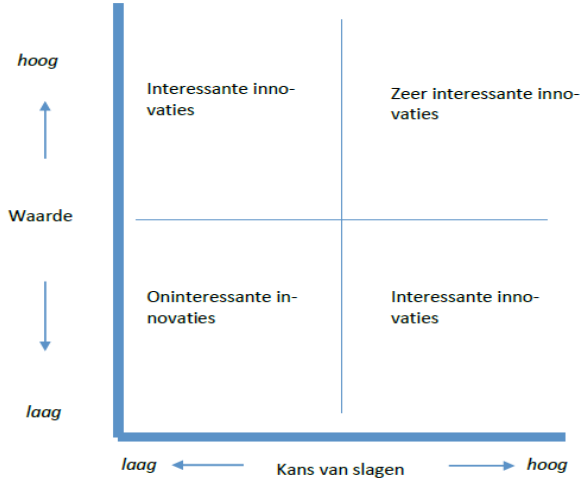
Organisation/ Cluster	Name
Managers Rijkswater	
Provincie Limburg (NL)	Sylvia Spierts
Rijkswaterstaat Zuid Nederland	Lea Crijns
Rijkswaterstaat WVL	Ageeth Boos en Eric Copius Peereboom
Vlaamse Waterweg	Joke Verstraelen
OVAM	Kris van Looy en Annelies Scholaert
Managers Regional Water	
Waterschap Limburg	Loek Berden en Rik ten Brink
Vlaamse Milieu Maatschappij	Michel Decat
Wasserverbad Eifel Rur	Kerstin Kamp

Organisation/ Cluster	Name
Kennisinstellingen	
Open Universiteit Heerlen	Ansje Lohr
Hogeschool Zuyd	Eric Hamers
RWTH Aachen	Simone Lechthaler
Afvalpreventie	
IVN Nature education	Noì Boesten
Reg. Landschap Kempen en Maasland	Sofie Wyns
Gemeenten Schone Maas	Dion Nijskens
Vlaamse gemeente Lanaken	Bart Hoelbeek
Facilitation	
Copernicos	Arjen Ros en Martine Folkersma
Deltares	Heleen Vreugdenhill

7. Appendix

The STORM approach

- In a STORMsession, participants jointly look at the potential value of an innovation and the chances of success
- After having developed common lines of reasoning, the participants search together for actions that might increase the potential value and/ or the chances of success
- These actions intervene on jointly identified levers that determine the value and chance of success. These measures form building blocks for a possible follow-up



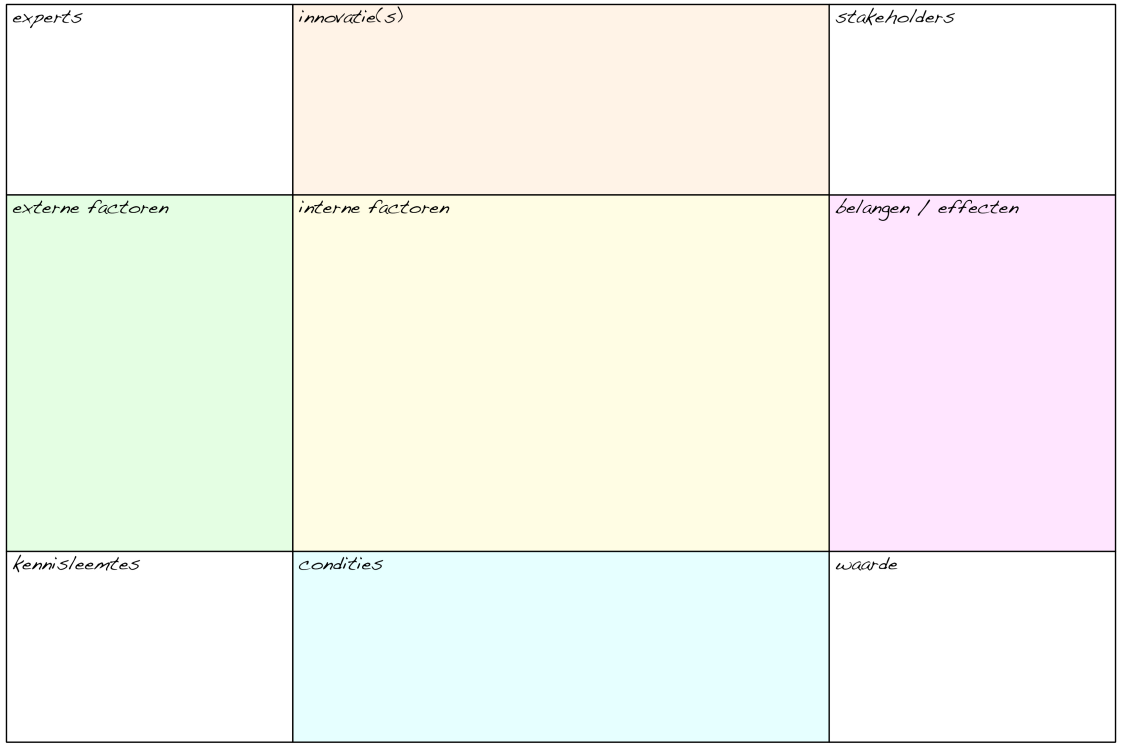
7. Appendix

The STORM Canvas

Thinking from the perspective of different stakeholders, we make an inventory of the most important effects (pink) to which the innovation must contribute

We then identify factors that influence these effects. We distinguish between internal system factors (yellow), that can be influenced by the innovation (brown), and external factors that occur independently of the innovation (green)

Conditions (blue) are a specific set of factors that often mainly influence the chances of success, such as legislation and regulations, resistance among users, etc. It is often useful to pay separate attention to these factors.



7. Appendix

System Dynamic Modelling

Systeemdynamische modellen (System Dynamics) kennen twee soorten elementaire grootheden:

Blokken waarin zaken verzameld worden. Bijvoorbeeld een hoeveelheid geld op de bank, het aantal beschikbare werknemers bij een bedrijf, het aantal onderhanden projecten of de hoeveelheid land dat een boer verbouwd.
Al deze zaken fluctueren in de loop van de tijd; ze nemen toe of ze verminderen weer. Soms wat sneller, soms langzaam.

Dat toenemen of verminderen van de verzamelde zaken wordt veroorzaakt doordat er iets in of uit deze verzamelde hoeveelheden stroomt; vandaar een pijpleiding. En stromen betekent dat er in een zeker tijdsbestek een bepaalde hoeveelheid aan de 'verzameling' wordt toegevoegd (het aantal verzamelde zaken stijgt) of dat er iets uit weggenomen wordt (het aantal verzamelde zaken daalt weer).

Dit onderscheid is van belang omdat meestal geldt dat de hoogte van de verzamelingen iets zeggen over hoe goed 'het' gaat. Hoeveel geld op je rekening, hoeveel medewerkers in dienst, hoeveel actieve klanten. Overigens is méér niet altijd beter, denk bijvoorbeeld aan de verzameling van projecten die achterloopt op de planning of het aantal uitstaande facturen waarvan de betalingstermijn overschreden is.
Daarnaast geldt altijd dat al deze zaken – die laten zien hoe goed het gaat – nooit rechtstreeks te veranderen zijn. Zo beweegt de hoeveelheid geld op je bankrekening mee met salarisstortingen door je werkgever (banksaldo omhoog) en met pintransacties of het automatisch afschrijven van bedragen voor huur of hypotheek (banksaldo omlaag) en verlaagt het saldo openstaande facturen wanneer klanten (alsnog) betalen.

We gebruiken verder nog twee elementen als hulp in de modellen:

Modelvariabelen waarin we óf constanten opnemen óf eenvoudige berekeningen maken.

Verbindingspijlen die aangeven welke variabele (maar dat kunnen ook 'verzamelingen' of 'pijpleidingen' zijn) gebruikt moet worden in een andere variabele: de waarde van de variabele aan de staart van de pijl bepaalt het resultaat voor de waarde van de variabele aan de punt van de pijl. Wanneer er meerdere pijlen aankomen in één variabele bepalen al deze inkomende variabelen samen het resultaat van deze doelvariabele. Of anders gezegd: ieder van deze inkomende variabelen is van invloed op het uiteindelijke resultaat in de doelvariabele.

Tot slot is van belang te realiseren dat alleen de 'stromen' en de hulpvariabelen te beïnvloeden zijn wanneer ze niet bepaald worden door een andere variabele; dit zijn de knoppen waarmee te 'sturen' is. En sturen bedoelen we hier in de meest ruime zin: soms bepaalt de overheid hoe een bepaalde knop werkt (of verandert) vanwege wetgeving, soms is de markt bepalend hoe een knop staat (bijvoorbeeld gemiddeld prijspeil) en is die door een individuele partij in de markt nauwelijks te beïnvloeden.

7. Appendix

Quality Assurance Models

MODEL		
Is de juiste systeemgrens gekozen? Zijn de belangrijkste 'stuurprogramma's' onderdeel van het model?	√	√
Is de modelstructuur consistent met systeembeschrijvingen? En heeft het een correct aggregatieniveau? Bevatten de beslissingsregels het gedrag van de actoren in het systeem?	√	√
Is het model consistent in termen van afmetingen en eenheden?		√
Zijn de parameter-waarden correct met de relevante kennis hierover? Komen de parameters voor in werkelijkheid?	√	√
Is het model getest op extreme omstandigheden, en blijven de formules dan overeind?		√
Komt het gedrag dat gesimuleerd wordt overeen met gedrag in de realiteit? Komt vreemd gedrag voor wanneer de aannames veranderen?		√
Kan het model met succes de reactie weergeven van het gemodelleerde systeem onder nieuwe omstandigheden?		√
Hoe gevoelig is het model voor variatie binnen het onzekerheidsbereik?		√
Helpt het model en het modelleringsproces om het echte systeem te verbeteren?	√	√
MODELLERING PROCES		
Groeps-modelbouwtechniek wordt veel gebruikt door Copernicos, in groepsmodellering sessies controleert Copernicos continue de redeneerlijnen; Copernicos faciliteert al jarenlang groeps-sessies. Actief luisteren behoort tot de kernkwaliteiten van Copernicos	√	√
Alle modelbouwers zijn hoog opgeleid en/ of ervaren en houden de nieuwste ontwikkelingen op het gebied van SD bij	√	√
Copernicos beoordeelt elkaars werk in een open cultuur en biedt feedback en ondersteuning wanneer dat nodig is	√	√
Copernicos heeft een directe werkrelatie met de ontwikkelaars van de standaardsoftware, alsmede met modelbouwers die in opdracht werken aan specifieke problemen	√	√
Copernicos is gespecialiseerd in een aantal inhoudelijke werkgebieden waarbij systeemdynamica wordt toegepast, in het bijzonder Asset en Innovation Management.	√	√
Copernicos zorgt voor: een directe structuurtest, d.w.z. een visuele controle van de structuur via meerdere 'tools'		√
Controle op resultaten: alle relevante variabelen worden gecontroleerd en kunnen in diagrammen worden gepresenteerd. Ook onderliggende factoren kunnen zichtbaar worden gemaakt door middel van causale tracering. Hierdoor en door middel van gedrag kunnen we reflecteren op de structuur van het model		√
Gedragsreproductie, d.w.z. dat modeluitvoer wordt vergeleken met historische gegevens		√
Sommige gevalideerde 'modules' worden hergebruikt. Ze hebben al een standaardkwaliteit		√
Modelonderdelen worden gearchiveerd en opnieuw gebruikt		√
PROJECTMANAGEMENT		
De eisen en wensen van de klant worden geregistreerd, gedocumenteerd en gepland	√	√
Versiemanagement is geregeld		√
Modellen worden in teams ontwikkeld		√
Cliënten mogen deelnemen als stakeholder in het ontwikkelingsproces	√	√