



# **Three Waters Integrated Modelling**

**A necessity, reality or  
pipedream**

# **Three Waters Integrated Modelling ?**

- **Start with some definitions**
- **Pipedream – modelling or modeller's utopia ?**
- **Necessity – Under what circumstances is it necessary to integrate our models**
- **Reality – what is current practice ??**
- **Some conclusions and discussion**

# Definitions

## Three Waters

- New term meaning the three waters that are the typically the responsibility of councils in New Zealand

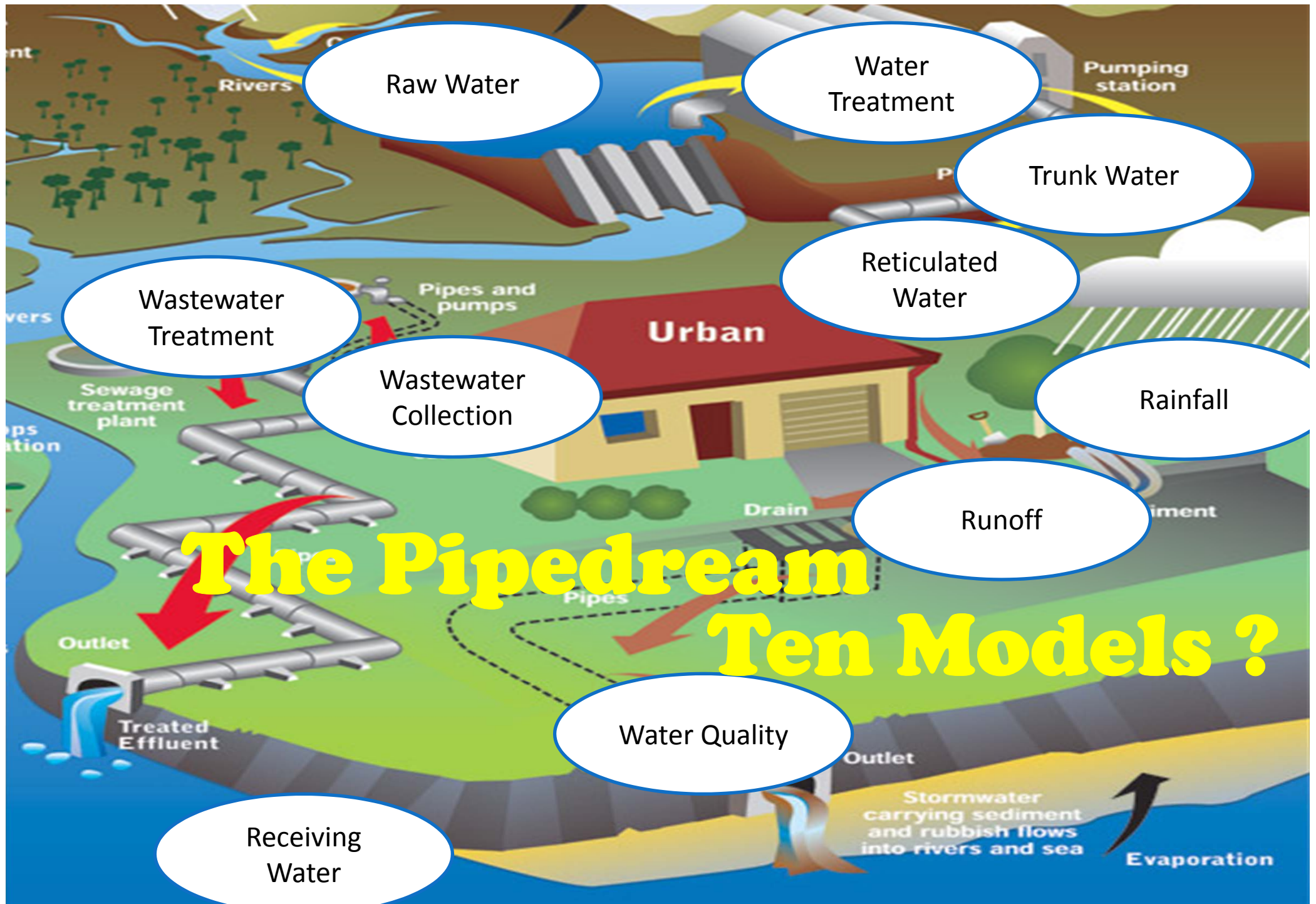
## Integrated

- combining or coordinating separate elements so as to provide a harmonious, interrelated whole:
- organised or structured so that constituent units function cooperatively

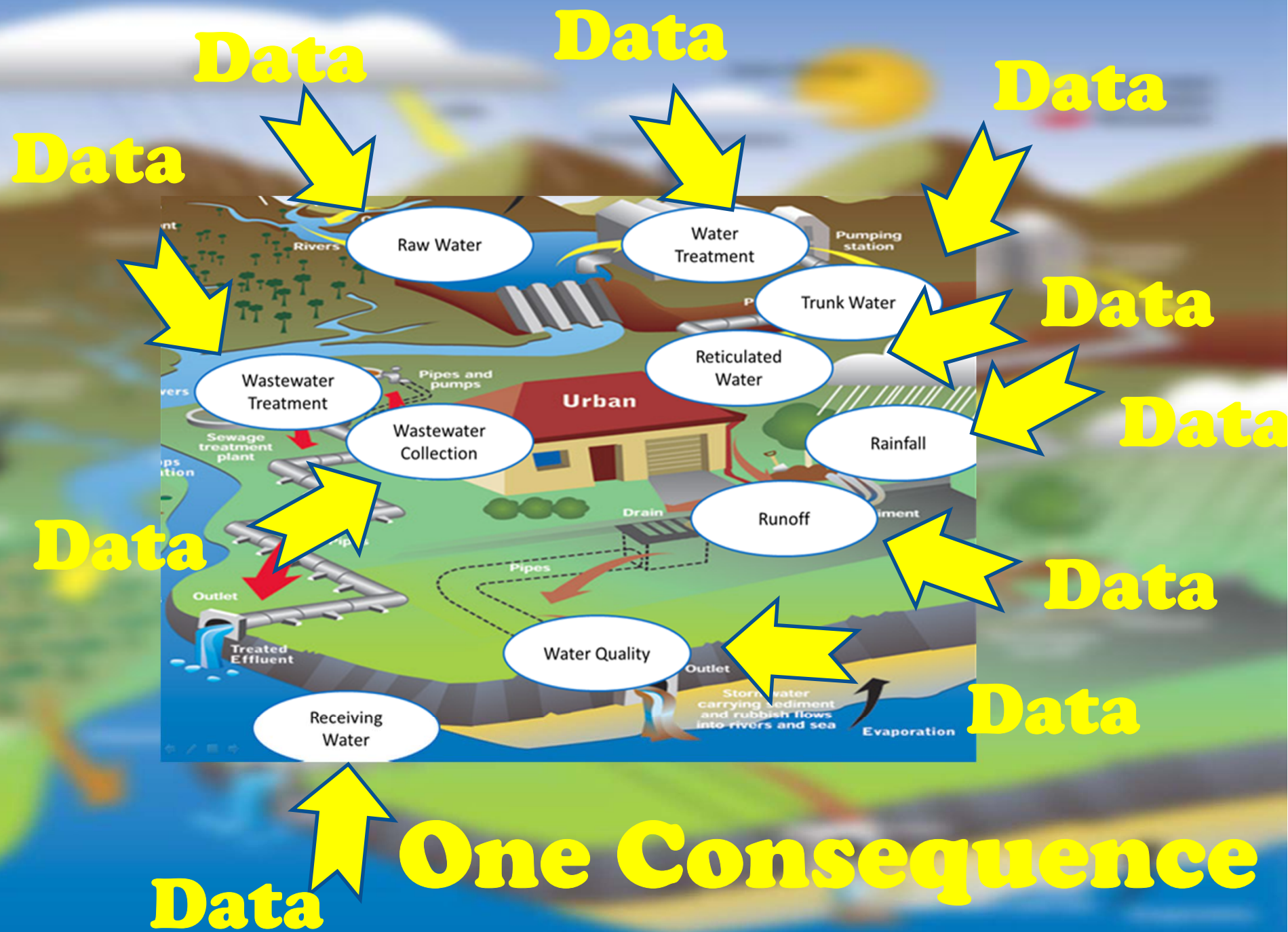
## Modelling

- to simulate (a process, concept, or the operation of a system), commonly with the aid of a computer.











**One Consequence**



# **So – The pipedream.....**

- **Is technically possible**
- **Very interesting**
- **More detail & accuracy = More Data**
- **More Data = More Dollars**
- **Danger is getting wrapped up with these issues that will need a team of modellers to fix it**
- **We might forget the issue we are trying to resolve !**



# Making the Pipedream work

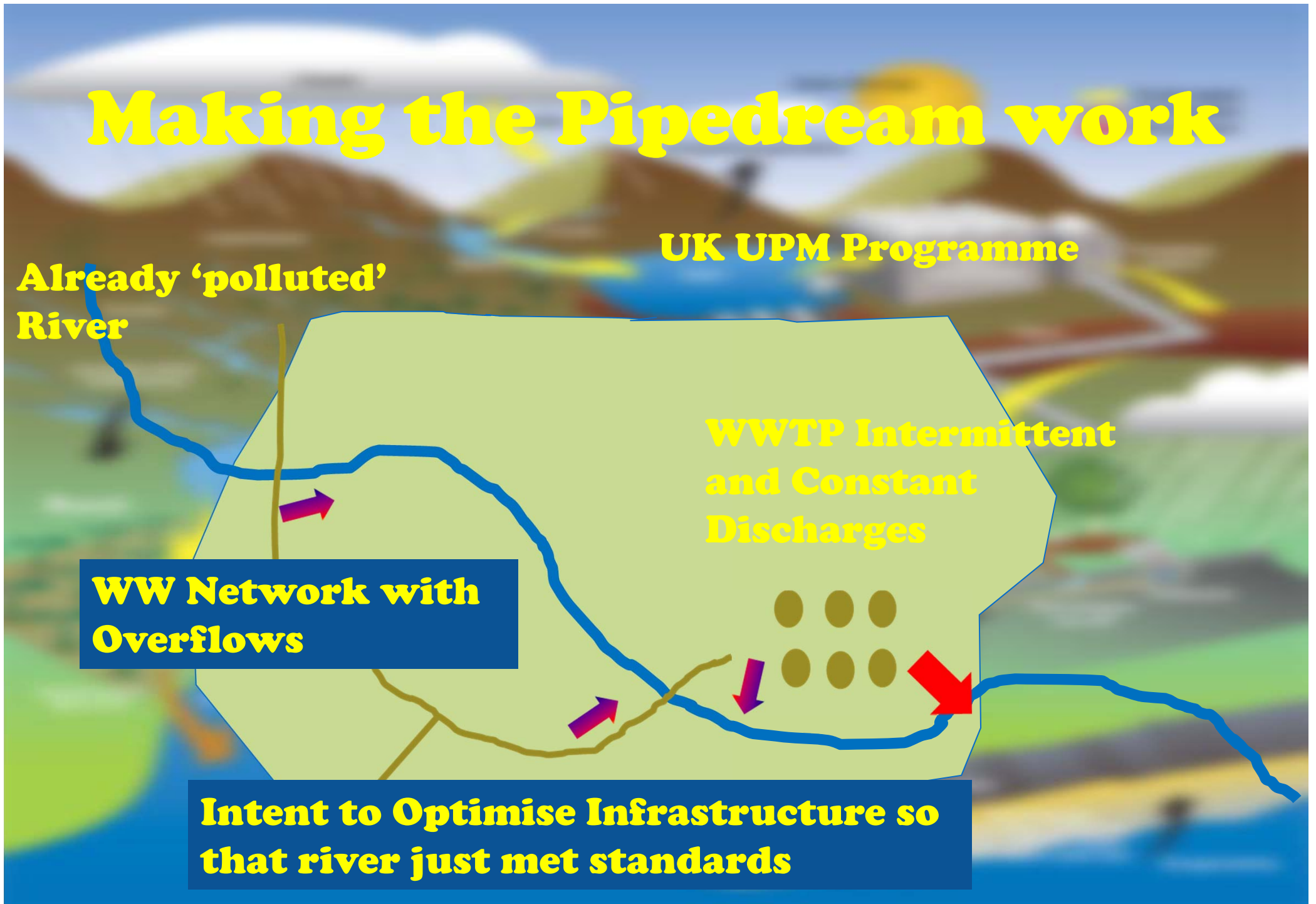
UK UPM Programme

Already 'polluted'  
River

WWTP Intermittent  
and Constant  
Discharges

WW Network with  
Overflows

Intent to Optimise Infrastructure so  
that river just met standards



# Models Used

- **Rainfall – Stormpac ( Synthetic)**
- **Wastewater Network – Hydroworks with Quality**
- **WWTP Discharges – Stoa / Biowin**
- **River Model – Mike 11 with ST / AD**



# **Idealised vs. Modified**

- **Rainfall – Long Time Series – Cont. Sim**
- **Intermittent discharges – QSIM**
- **WWTP Discharges – Real Time**
- **River – Low flow / quality in real time**
- **Impacts =  $\text{NH}_3$  and DO**
- **Rainfall – Sampled Time Series**
- **Intermittent discharges – QSIM**
- **WWTP Discharges – Monte Carlo Except for Inlet**
- **River – Spreadsheet**
- **Impacts =  $\text{NH}_4$  and BOD & look up**



# **Lessons from the exercise**

- **Difficulties in application lead to simplification**
- **Did it affect the outcome – probably not**
- **Lessons were applied and used the next time around**
- **‘next time around’ technology had improved**

# **Necessity**

**Only required where integration is  
key to solving the problem.....**

**So first define  
the problem !**





**Or**

**Where the models use common data sets**

**Demand (water and wastewater)**

**Hydrological parameters ( SW and Wastewater)**

**Rainfall**



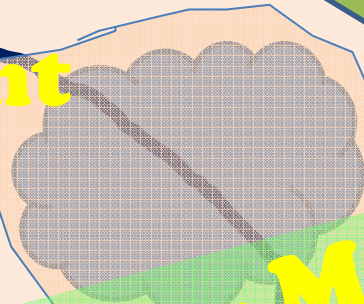
# Necessity – An Example

**Simplified Model**

**Detailed Model**

**No Model**

**Catchment**



**Conclusion – Model only what is necessary**

**Ocean**

**River**



# **Reality – What are people doing?**

**City A**

**Trunk Wastewater Model ( short and Long Term gauging)**

**Rapid Flood Hazard Assessment – To assist with district plan – will drive detailed investigation (if required)**

**Trunk Water Model with field test**





# **Reality – What are people doing?**

**City A – What about integration ?**

**Same model platform(ish)**

**Common project meetings**

**Common data sets for population & impermeability, and terrain**

**Otherwise no need**





# **Reality – What are people doing?**

**City B**

**Trunk Wastewater Model – Drove detailed study in 4 areas**

**Detailed catchment models for SW catchments**

**Macro Water model ( but with detail )  
drove investigations at zonal level**



# **Reality – What are people doing?**

**City B – What about integration**

**Common data and meetings**

**Wastewater problem areas no SW problem**

**SW catchments don't have major WW issues-but could have**



# Conclusions

**3 Waters Integrated Modelling is possible**

**Not essential that models are linked**

**Planning and modifications should and will happen**

**Integrated projects rather than tools are preferable**

# Discussion

**Integrated modelling – your experiences ?**

**Other examples of integrated modelling – there must be heaps ?**



