



Water Quality Modelling in ICM

Duncan Kitts



Innovyze[®]

The bottom of the slide features a decorative graphic of overlapping, wavy lines in various shades of blue and teal, creating a sense of movement and depth.

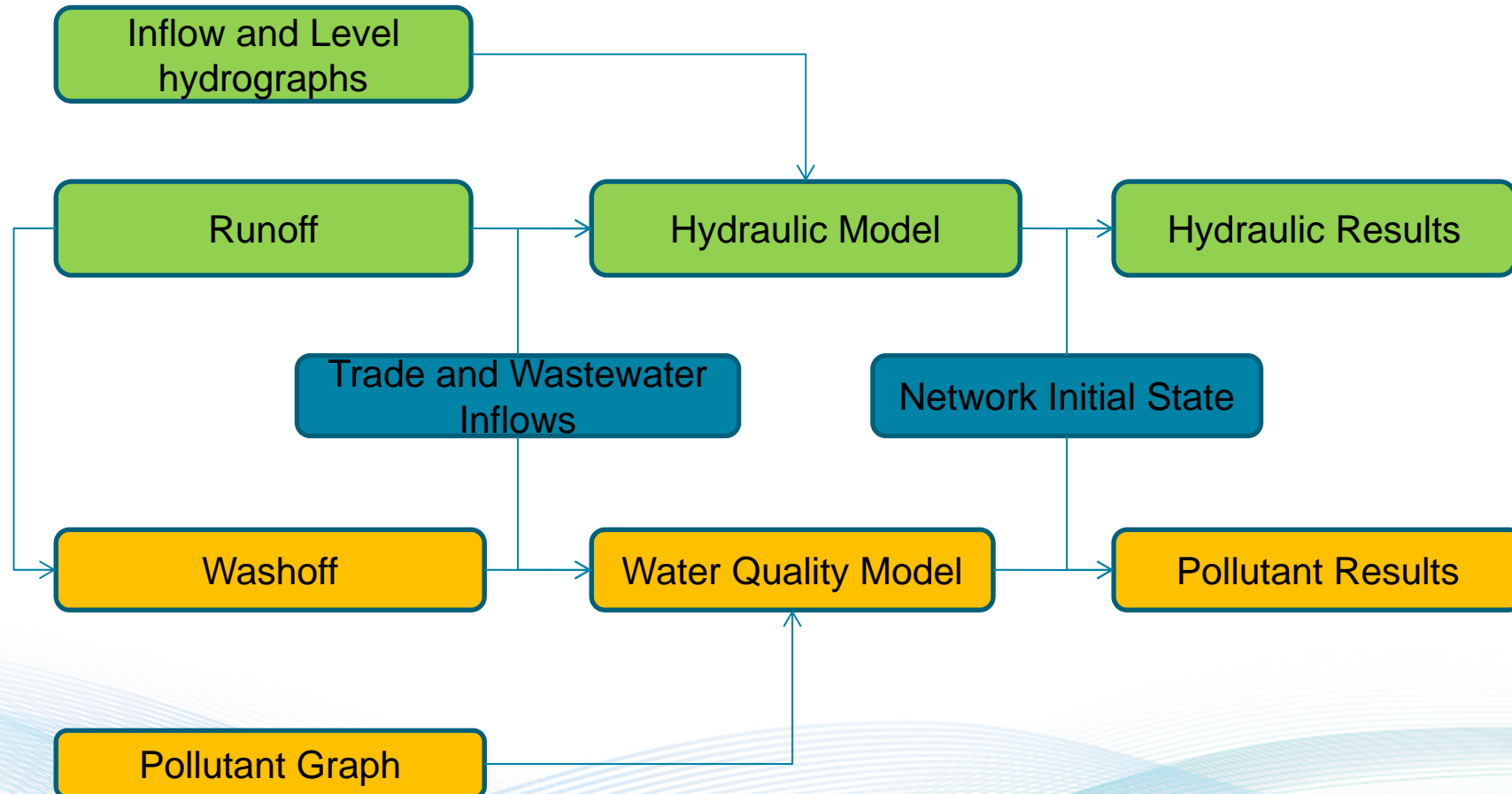
Water Quality Modelling

- Water Framework Directive (WFD)-2015
 - Maintain and improve the quality of Europe's waters
 - Good Status for all bodies of water
 - Water management based on river catchments
- UK Environmental Quality Standards
 - Aquatic
 - Bathing
 - Amenity
- Significant water quality changes can occur within the drainage system

Infoworks ICM

- Water quality in piped network, rivers and floodplain in 1D and 2D domains.
- Pollutants can enter the system at:-
 - Discrete point inflows
 - Lateral inflows
 - Washoff from subcatchment surfaces

Water Quality Modelling Process



Existing Water Quality Functionality

- Dissolved and attached pollutants
- Conservative and non-Conservative pollutants
- Growth/Decay Functions
- User-defined processes
- 2D

Dissolved Oxygen Process

- Built-in Dissolved Oxygen Process:-
 - Saturated Dissolved Oxygen based on salinity and temperature
 - Re-aeration (including at structures)
 - Ultimate Oxygen Demand (BOD or COD)
 - Nitrification of Ammoniacal Nitrogen to nitrites/nitrates
 - De-nitrification during Anoxic conditions.

New Functionality for ICM 3.0

- Algae
- Macrophytes
- Eutrophication in Rivers

- Importance
 - Impede Drainage systems
 - Block Pumps and sluices
 - Interfere with navigation, fishing and other recreation
 - Odour
 - Problems in potable water
 - Health hazard to humans, livestock and wildlife



Algae-Dissolved and Attached

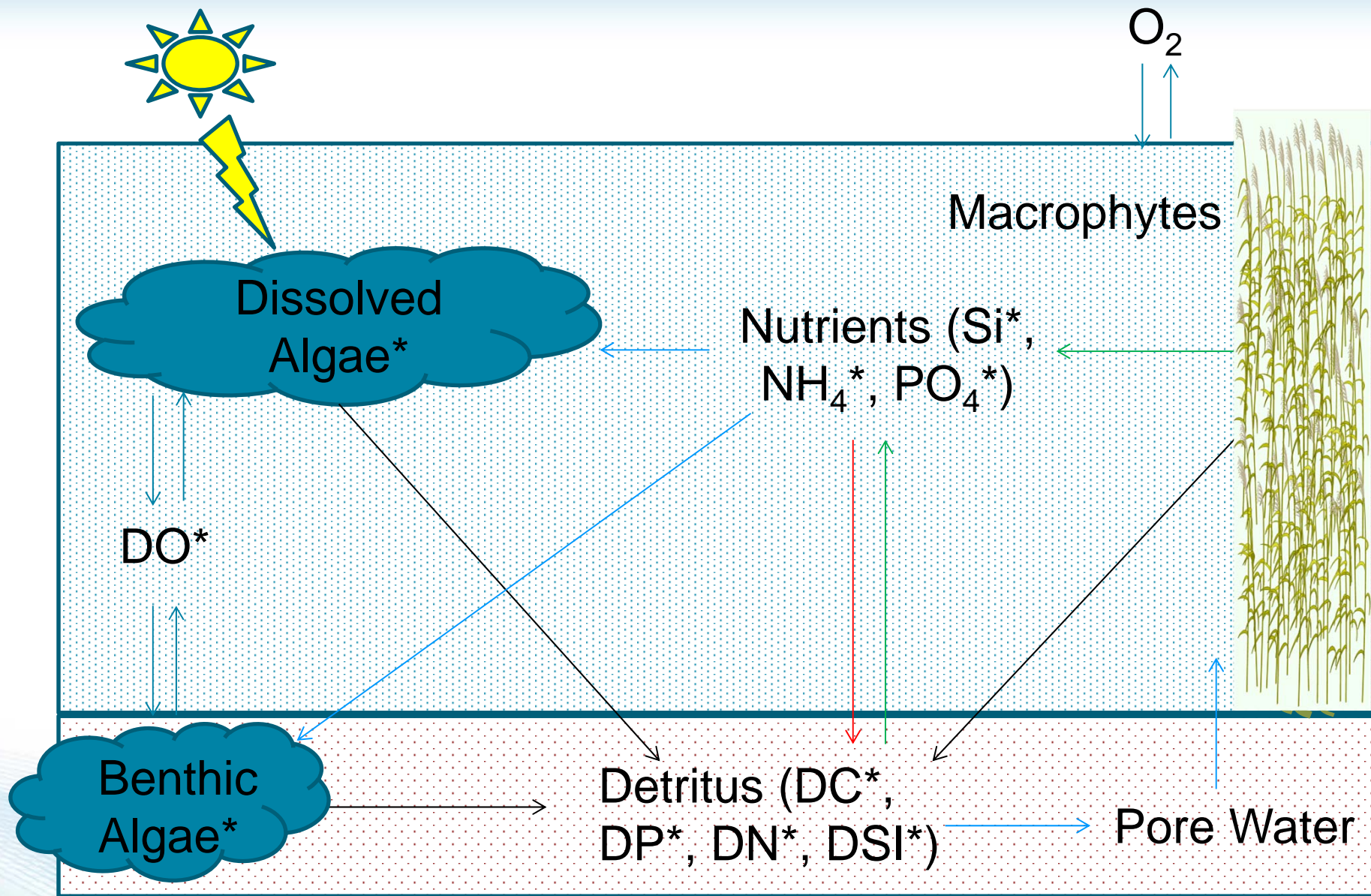
- Dissolved and attached algae
 - Dissolved represent suspended organisms
 - Attached represent benthic algae
- Growth and decay
- Nutrient dependent- NO_3 , TPH and Si
- Solar Radiation to represent light intensity
- Death of algae lead to detrital pollutants



Macrophytes

- Macrophytes represent plants in water column
- Leaves in contact with air
- Nutrient dependent- NO_3 , TPH and Si
- Solar Radiation to represent light intensity
- Death of macrophytes leads to detritus

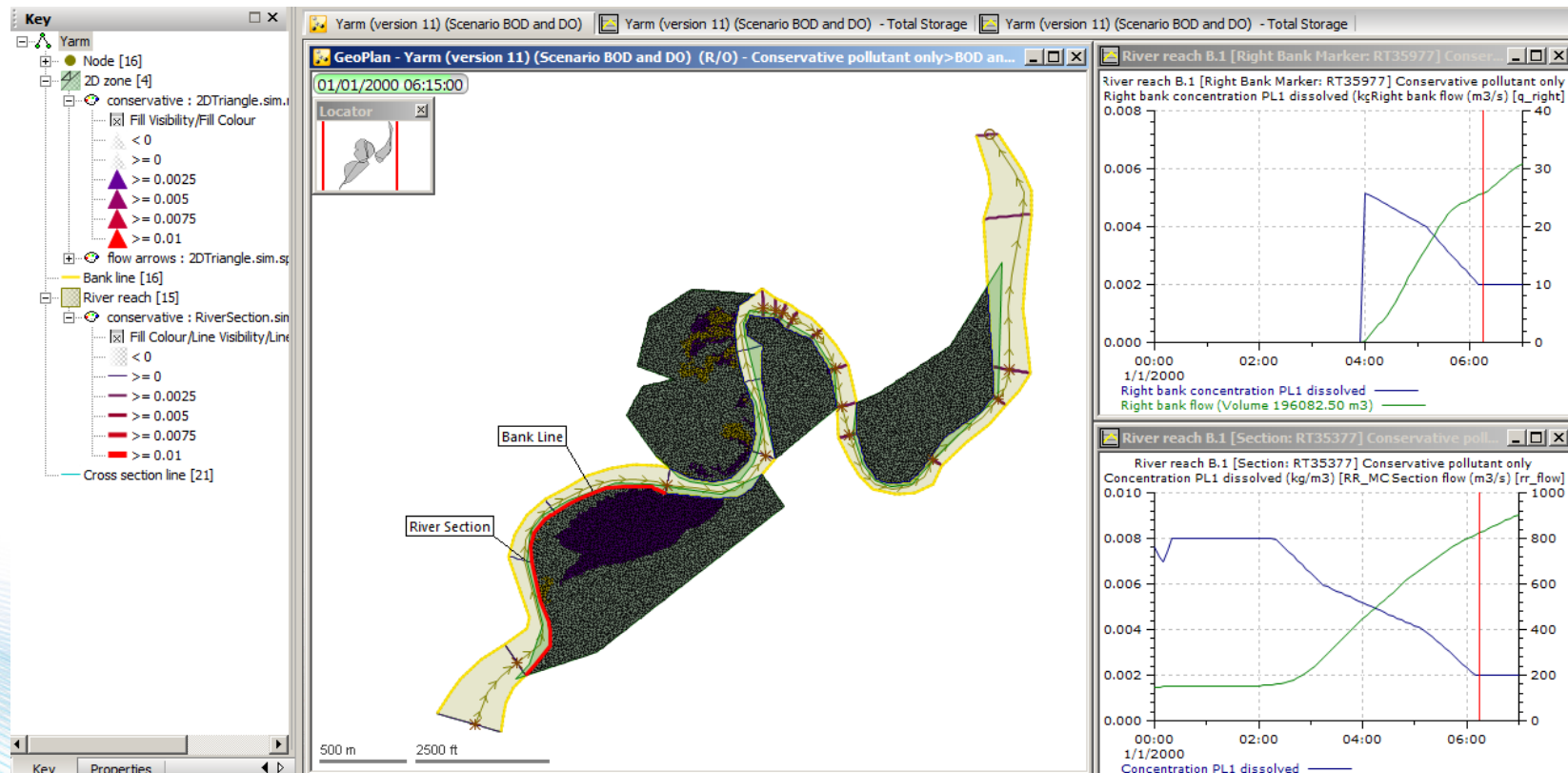




*=Parameter can be specified

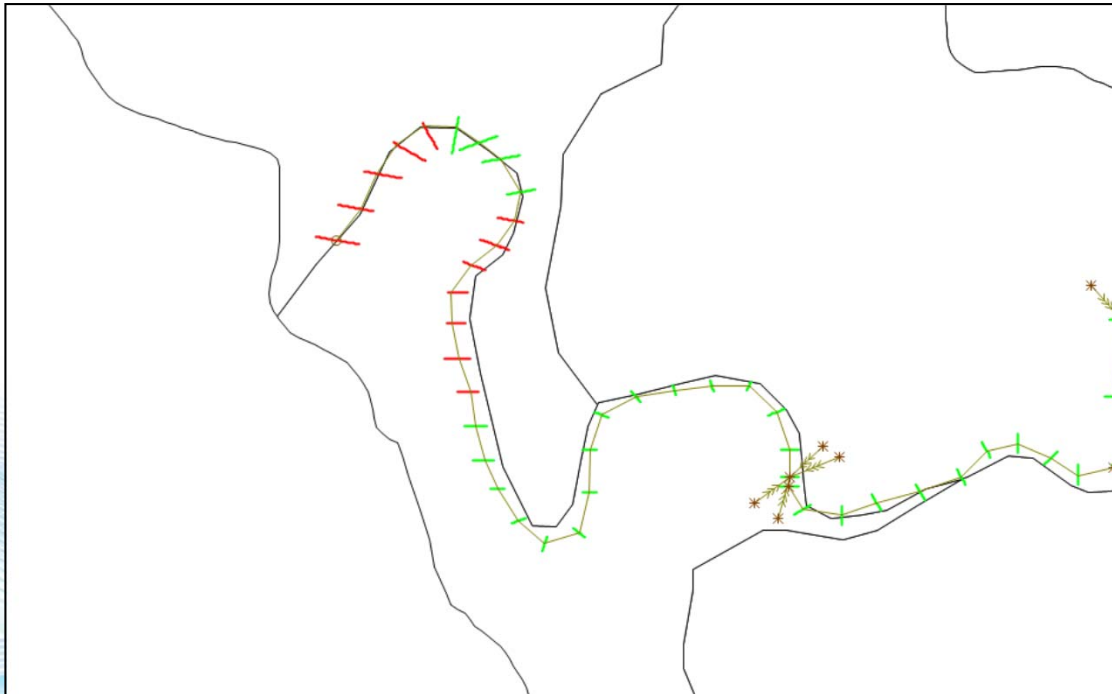
Results

- Results available in a range of formats
- Water Quality: Concentration (mg/l) and Mass Flow (kg)



Theming Results

- Theme any results parameter including water quality results
- Can Theme WFD thresholds
- Powerful visual tool to determine areas of 'good' status



Innovyze[®]

Summary

- Water quality across all domains.
- Various built in processes:-
 - Dissolved oxygen
 - Algae/Macrophyte growth/Decay
 - Nutrient cycling
 - User-defined
- Theming of water quality outputs.
- Powerful water quality tool.