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Water Research Laboratory

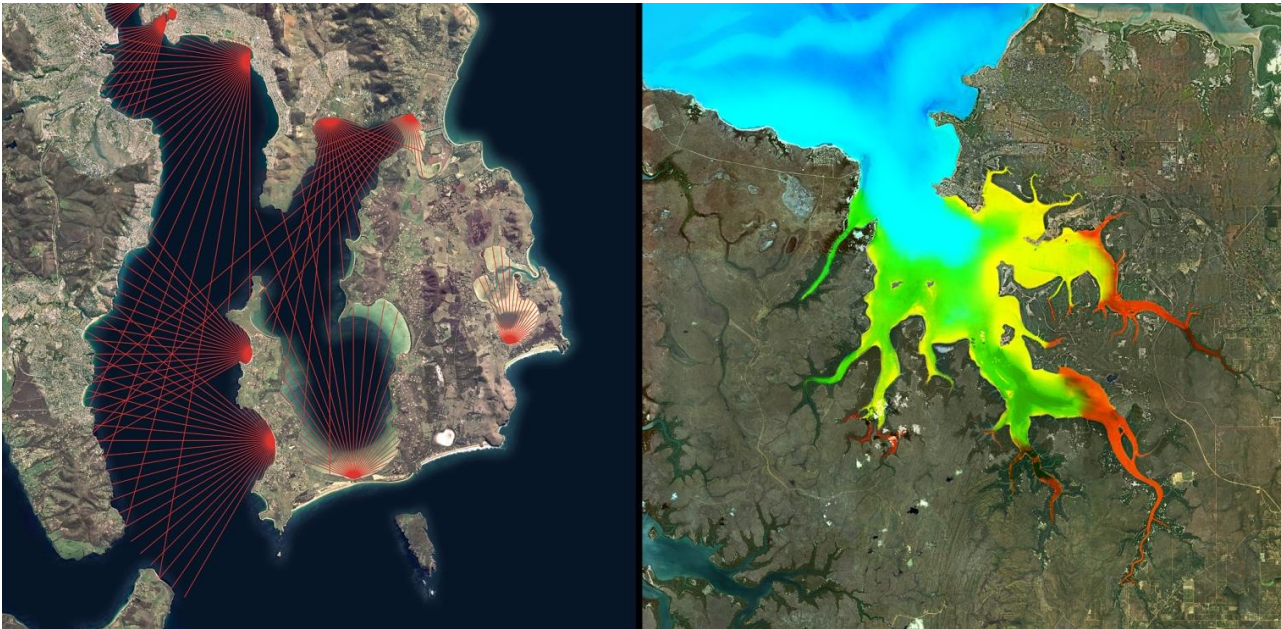
Numerical Modelling

Never Stand Still

Faculty of Engineering

School of Civil and Environmental Engineering

The Water Research Laboratory employs a vast range of numerical (computer) models in its projects and research efforts. These software programs include hydrodynamic models, water quality models, sediment transport models, wave transformation models, rainfall and runoff models, and groundwater models. These programs are run on a local network of computers consisting of PC's and UNIX work stations.



(Left) Wave Hind casting for Clarence City Council, Tasmania. (Right) Water quality modelling of Darwin Harbour using the RMA Modelling Suite.

Hydrodynamic Models

- ANSYS CFX: A general purpose computation fluid dynamics software suite with advanced solver and pre- and post-processing capabilities
- HEC-RAS: 1D steady hydrodynamic model
- RMA-2: Depth averaged, finite element, unsteady hydrodynamic model
- RMA-10: 3D finite element hydrodynamic and water quality model
- MIKE-11: 1D finite difference unsteady hydrodynamic model used for modelling rivers and channels
- MIKE-21: 2D finite difference unsteady hydrodynamic model used for modelling rivers, estuaries, bays and flood plains
- MIKE Flood: Dynamically links 1D and 2D MIKE models, used for flooding and where rivers meet estuaries

Water Quality Models

- 3D-RWALK: Random walk 2D and 3D water quality model (works in RMA-2 & 10)
- HSPF: Rural catchment runoff and water quality model
- QUAL-2E: 2D estuarine water quality model
- RMA-11: 2D/3D, finite element water quality model
- SWMM: Urban drainage catchment runoff and water quality/quantity model

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Sediment Transport Models

- GENESIS: Shoreline change model, based on temporal and spatial differences in longshore transport caused by breaking waves
- HEC-6: Sediment transport and sedimentation
- RMA-11: 2D/3D, finite element sediment transport model
- SBEACH: Cross-shore sediment transport model
- UNIBEST: Simulates longshore and cross-shore sediment transport



GENESIS Modelling for detailed design of Semaphore Park offshore breakwater (SA)

Wave Models

- ACES: General coastal engineering package (part of CEDAS)
- BERKHOFF: In-house finite difference shoaling and diffraction model
- CMS: A free surface wave modelling suite
- HINDCAST: In-house wave prediction program based on the SPM (1984) method
- RCPWAVE: A short wave open coast model (part of CEDAS)
- REF/DIF: Combined shoaling, refraction and diffraction finite difference model
- REFRACT: Shoaling and refraction finite difference model for linear and non-linear waves
- SHALWV: A full spectral wave model ideal for examining inshore wave climates that result from offshore wave climate (part of CMS)
- SWAN: A full spectral wave model suitable for wind generated waves and refraction
- STWAVE: Simulates time independent spectral wave energy propagation (part of CEDAS)
- WAVEREF: In-house finite difference wave shoaling and refraction model

Rainfall Runoff Models

- CULVERT: Steady state culvert calculations
- ILSAX: Urban stormwater drainage design and evaluation program
- RORB: A general runoff and stream flow routing program which calculates hydrographs from rainfall and other channel inputs
- WBNM: Boyd's Watershed Bounded Network Model for runoff routing

Groundwater Models

- ERMAPPER: Remote sensing interpretation package
- FEFLOW: 3D finite element groundwater model
- GW: Geochemists Workbench is a set of software tools for chemical reactions, equilibrium states, calculating stability and modelling reactive transport
- MODFLOW: 3D finite element groundwater model
- PHREEQC: 3D finite Equilibrium hydrogeochemical reaction for speciation and 1D transport model
- SUTRA: 2D finite element groundwater model

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