

# ELCOM-CAEDYM

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<b>Abstract</b>	
<b>Name</b>	ELCOM-CAEDYM (Estuary, Lake and Coastal Ocean Model - Computational Aquatic Ecosystem DYNamics Model)
<b>Description</b>	Three-dimensional lake, estuary and coastal ocean water quality model
<b>Local Contact</b>	David Hamilton, University of Waikato
<b>Wiki URL</b>	<a href="https://teamwork.niwa.co.nz/display/IFM/ELCOM-CAEDYM">https://teamwork.niwa.co.nz/display/IFM/ELCOM-CAEDYM</a>

<b>Scope</b>	
<b>Intended biophysical domains</b>	Lakes Estuaries Coastal
<b>Does the model address water quality</b>	Yes
<b>Water quality parameters</b>	Nitrogen Phosphorus Microbes Sediment Generic Other Includes chlorophyll (multiple phytoplankton groups), dissolved oxygen and physical variables
<b>Intended purpose</b>	Spatially resolved, coupled hydrodynamic-ecological model intended for simulation and prediction of water quality in lakes, reservoirs, estuaries and the coast
<b>Intended types of user</b>	Scientists, academics, students, consultants
<b>Intended breadth of user base (in-house specialist to widespread)</b>	Wide breadth of users and can be picked up by users with moderate expertise in modelling
<b>Geographic range limitations</b>	Applicable globally
<b>Spatial resolution</b>	Three-dimensional; grid sizes depend on size of domain (e.g., lake) and time step
<b>Spatial extent</b>	Farm or small catchment/aquifer/river network/lake/estuary Medium or large catchment/aquifer/river network/lake/estuary or coastal embayment
<b>Steady state or dynamic</b>	Dynamic
<b>Temporal resolution</b>	Time step from seconds to hours (depends of domain size and grid sizes)
<b>Temporal extent</b>	Can simulate for typically up to one year. Occasionally for periods of 2-3 years.
<b>Spatial types</b>	Other Grid x-y-z domain
<b>Spatial dimensions</b>	3D
<b>Supermodel Membership</b>	If part of a supermodel, describe

## Inputs

<b>Climate</b>	Climate data
<b>Topography and topology</b>	Lake bed surface
<b>Soils</b>	
<b>Landcover/use</b>	
<b>Groundwater</b>	
<b>Water quantity/quality flux and state</b>	Stream flow Stream concentrations and/or mass  Details: Initial data required to resolve 3-D variations in lake concentration

Input data required: old items to be removed once transferred to new template

<b>Outputs</b>	
<b>Climate</b>	
<b>Topography and topology</b>	
<b>Soils</b>	
<b>Landcover/use</b>	
<b>Groundwater</b>	
<b>Water quantity/quality flux and state</b>	Lake concentrations/or and mass  Details: 3-D variations in lake water concentrations resolved at hourly or daily time scale

Output data produced: old items to be removed once transferred to new template

<b>Development history</b>	
<b>Main developers</b>	Centre for Water Research, The University of Western Australia ( <a href="http://www.cwr.uwa.edu.au">www.cwr.uwa.edu.au</a> )
<b>Other development organisations</b>	Several organisations undertake development activities by agreement with Centre for Water Research, The University of Western Australia
<b>Current custodian organisation</b>	Centre for Water Research, The University of Western Australia ( <a href="http://www.cwr.uwa.edu.au">www.cwr.uwa.edu.au</a> )
<b>Funding mechanism</b>	Has been funded through alignment with applied projects
<b>State of development</b>	stable release
<b>First development year</b>	1997
<b>Latest release year</b>	2012
<b>Latest version</b>	2.2
<b>Current development activity</b>	Several organisations undertake development activities by agreement with Centre for Water Research, The University of Western Australia
<b>Likely longevity</b>	Persistent

<b>Cost and IP</b>	
<b>Purchase or licence cost</b>	AUD \$5,000
<b>Support cost</b>	Options are given for various levels of support and cost beyond obtaining the executable at AUD \$5,000
<b>Licence type</b>	Executable
<b>Commercial or IP constraints on use</b>	No restrictions on academic use. Commercial use by arrangement but generally encompassed within AUD \$5000 fee
<b>Open/Closed Source</b>	Closed Source
<b>Applications</b>	

Locations	Organisations	Description	Publications
Lake Rotoiti	University of Waikato	PhD thesis: N. von Westernhagen 2010. Measurements and modelling of eutrophication processes in Lake Rotoiti, New Zealand	<a href="http://hdl.handle.net/10289/4817">http://hdl.handle.net/10289/4817</a>

<b>Technical considerations</b>	
<b>Languages used</b>	Fortran 95
<b>Is a formal API defined?</b>	
<b>Is the model engine separated from the user interface?</b>	Has separate user interface
<b>User Interface</b>	Graphical Desktop
<b>Techniques/methods for data input</b>	Text input but there are several MATLAB scripts to assist with data preparation
<b>Input data formats</b>	CSV, text
<b>Techniques/methods for data output</b>	Output is NetCDF. Software ARMS (included) is used for visualisation
<b>Output data formats</b>	NetCDF
<b>Techniques/methods for data visualisation</b>	Software ARMS (included) is used for visualisation
<b>Techniques/methods for user interaction and control</b>	ARMS software
<b>Methods included for calibration and uncertainty</b>	User-driven
<b>Operating system / platforms</b>	MS Windows Linux OS X
<b>Quality of code and systems engineering</b>	Quality control on code is exercised by the owner of the code (see <a href="http://www.cwr.uwa.edu.au">www.cwr.uwa.edu.au</a> )
<b>Willingness of developers to collaborate</b>	By arrangement with Centre for Water Research, The University of Western Australia
<b>Stability</b>	Software is stable; bugs are reported

<b>Availability of documentation of theory and code /software</b>	Has science manual and user's manual
<b>User information</b>	
<b>What do users have to learn?</b>	ARMS is the interface software. Knowledge of MATLAB is useful but not essential. Knowledge of water quality modelling significantly advances the expertise of the user because comprehensive calibration of water quality variables is generally involved. Comprehensive knowledge of lake hydrodynamics also extremely useful.
<b>Ease of learning</b>	Moderate to advanced
<b>Ease of use</b>	Moderate to advanced
<b>Availability and completeness of user documentation /manuals</b>	Manuals are comprehensive (science manual and user's manual)
<b>Availability of support</b>	Manuals are comprehensive (science manual, user's manual and programmer's guide)
<b>Willingness of developers to support users</b>	Moderate - depends on level of support that is purchased
<b>Availability of user forums</b>	Has comprehensive user forums
<b>Other information</b>	
<b>Linkages to other models</b>	Can potentially link to ROTAN and SWAT catchment models for input data and CLIMPACTS (climate model) for input data, but only via outputs from ROTAN/SWAT/CLIMPACTS being used as inputs to DYRESM-CAEDYM (linkage is not explicit coupling)
<b>Notes</b>	

## Links

Name	URL	Description
Centre for Water Research, The University of Western Australia	<a href="p://www.cwr.uwa.edu.au/software1/models1.php?mdid=2">p://www.cwr.uwa.edu.au/software1/models1.php?mdid=2</a>	Developer and distributor

## References

Ref	Description
<a href="http://www.cwr.uwa.edu.au/research/publications.php?special=elcom">http://www.cwr.uwa.edu.au/research/publications.php?special=elcom</a>	ELCOM publications
<a href="http://forums.cwr.uwa.edu.au/viewtopic.php?f=4&amp;t=28">http://forums.cwr.uwa.edu.au/viewtopic.php?f=4&amp;t=28</a>	CAEDYM publications