

# CITS7211 – Modelling Complex Systems

## Lecture 12: Modelling Water Resources with ELCOM-CAEDYM

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### Summary:

Where we talk about how ELCOM-CAEDYM models are used in the industry to model water resources. We take the application user's point of view. We explore the types of problems that ELCOM-CAEDYM can solve. We investigate the input data it takes and the output it produces. We learn how data is collected in the field to feed the models. We learn how the collection of CWR water management tools fits together.

Where we talk about how ELCOM-CAEDYM was designed and developed. We take the software developer's point of view. We briefly discuss the equations ELCOM-CAEDYM relies on and the numerical methods used to solve these equations. We investigate how the software is structured and how it has been validated and tested. We discuss the different system interfaces and the interaction among subsystems.

### Topics:

1. Water resources: data collection, processing and analysis.
2. A brief overview of the CWR system's architecture:
  - a. LDS: Lake Diagnostic System
  - b. The Shore Station.
  - c. ARMS: the Aquatic Real-time Management System.
  - d. ELCOM: Estuary, Lake and Coastal Ocean Model.
  - e. CAEDYM: Computational Aquatic Ecosystem Dynamics Model.
3. Methods of telemetry: GSM, CDMA, AMPS, 2.4 GHz Radio Link.
4. Raw data storage, filling, down sampling and averaging.
5. The database model: availability, storage and retrieval of large data sets.
6. Data visualization: MATLAB plotting and movies, OLARIS, the web view.
7. The conflict between new Java code and legacy Fortran applications.
8. Software engineering trade offs, model validation and testing.
9. Discussion.

### Reading:

1. ELCOM User's Manual – [http://www.cwr.uwa.edu.au/services/models/elcom/documentation/elcom\\_user\\_2\\_2\\_0/ELCOM\\_user.pdf](http://www.cwr.uwa.edu.au/services/models/elcom/documentation/elcom_user_2_2_0/ELCOM_user.pdf)
2. ELCOM Science Manual – [http://www.cwr.uwa.edu.au/services/models/elcom/documentation/elcom\\_science\\_2\\_2\\_0/ELCOM\\_Science.pdf](http://www.cwr.uwa.edu.au/services/models/elcom/documentation/elcom_science_2_2_0/ELCOM_Science.pdf)
3. CAEDYM User's Guide – [http://www.cwr.uwa.edu.au/services/models/caedym/documentation/UserManual/CAEDYMv2p3\\_UserGuide.pdf](http://www.cwr.uwa.edu.au/services/models/caedym/documentation/UserManual/CAEDYMv2p3_UserGuide.pdf)
4. CAEDYM Science Manual – [http://www.cwr.uwa.edu.au/services/models/caedym/documentation/ScienceManual/CAEDYMv2p3\\_SciManual.pdf](http://www.cwr.uwa.edu.au/services/models/caedym/documentation/ScienceManual/CAEDYMv2p3_SciManual.pdf)
5. CWR's web site – <http://www.cwr.uwa.edu.au/services/models.php>
6. Other Publications – <http://www.cwr.uwa.edu.au/research/publications.php>