

# A time-series database for environmental data

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## **Abstract**

Environmental data is often a time series without an elaborate data structure. However the large volumes of data make storage and retrieval efficiency important. Ease of use and compatibility with other programs and databases is needed for inter-discipline studies. Tideda is software that addresses many of these needs.

## **Keywords**

Time series, environmental, database

## 1 INTRODUCTION

Tideda is software for processing time-dependent data, particularly hydrological data. The software can be used to collect, store, edit, display and analyse such data. The software was first used in 1970 and has been under continuous development and enhancement ever since. It is used on numerous hardware platforms with the most popular being Microsoft Windows.

## DATA INPUT

To be used in a wide variety of applications the software accepts data input by many methods.

- keyboard
- tape reader
- digitiser (all known digitiser brands and chart types)
- electronic recorders/ dataloggers/ SCADA
- telemetry
- disk files (a variety of formats).

## DATA EXPORT

To enable the database to be used with other applications it must be accessible. This is done by

- ASCII file
- Clipboard
- Dynamic data exchange
- Excel add ins
- specialised export processes to other applications.

## DATA MANAGEMENT AND MANIPULATION

The data is stored in an extremely efficient binary format using compression methods that incur no overheads during retrieval e.g. the New Zealand water resources archive of approximately 1500 water level sites and 800 rainfall sites, recording at 15 minute intervals, many since the 1930s, occupies 3 Gigabytes of storage. There are no limits on file size or quantities of data processed other than those imposed by the operating system being used.

Non linear transformations can be applied to the data via ratings. These are commonly used to convert water levels to flows. This is done dynamically to the data for every process that uses the rated data i.e. water levels and ratings are stored, flows are not as they are a derived quantity. There are several other processes for transforming data.

Any process can use a subset of the data by applying a time filter. The filter allows data to be selected by any combination of hour, day, week, month or year e.g. plots of

a quantity from 9 a.m. to 6 p.m., Monday to Friday, for every January from 1990 to 1997.

## GRAPHICS

There are numerous processes for viewing the data. These include time series plots, cumulative distribution plots, wind roses (figure 1) and graphical editing of data. Similarly there are many tabular processes for displaying and summarising the data.

## SIMULATION AND CONTROL

Tideda has its own programming language. This allows you to write software to analyse data in any way you choose. Although it is a very simple language, it allows you to perform many calculations that are needed for scientific analysis of series data.

To enable automation of repetitious tasks all Tideda commands can be saved in a text file to enable the commands to be run again. These files can be edited to add, change or delete commands. They can be run from within Tideda or as piped input.

## THE FUTURE

The future is about the application of knowledge by analysis of data and presentation of useable information to a diverse audience including researchers, managers, planners, engineers and the public.

**Figure 1.** Wind rose plot to display distribution of wind velocities and direction w time.

