

Expert Group on Environment Statistics and Indicators 17th November 2020

- Flash presentation (3 minutes)

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Overview of Presentation

- Weather observing stations
- Examples of absolute precipitation indicators
- Flood risk and other hazards
- Climate data rescue
- Conclusions



Weather Observing Stations

- National meteorological agencies collect a large amount of daily and sub-daily weather-related data that could be used for compiling water statistics and completing parts of Water Accounts
- Synoptic stations collect data at set times e.g. 00h00, 03h00, 06h00 etc. using instruments such as an anemometer, wind vane, pressure sensor, thermometer, hygrometer, and rain gauge
- Climatological stations are less automated and may collect less data and at a lower frequency than synoptic stations
- Countries may also have stations maintained on a voluntary basis e.g. to collect rainfall data only
- Total precipitation and evapotranspiration are best calculated by meteorologists as they require detailed data and complex calculations
- Precipitation and evapotranspiration are inputs into the calculation of groundwater recharge
- General rainfall indicators can be calculated in absolute terms such as number of wet days or in relative terms such as in reference to means over a 30-year period. A day in Ireland with temperatures exceeding 30 degrees Celsius is very unusual but may be a welcome relief in hot countries!
- Rainfall indicators can be used to detect long-term changes in rainfall patterns



Indicator	Definition
Rain days	Total daily rainfall of 0.2 mm or more
Wet days	Total daily rainfall of 1.0 mm or more
Very wet days	Days with total daily rainfall of 10 mm or more
Extremely wet days	Days with total daily rainfall of 20 mm or more
Wet spell	A period of 15 or more consecutive wet days
Absolute drought	A period of 15 or more consecutive days on none of which 0.2 mm or more of rain falls
Partial drought	A period of at least 29 days in which the mean daily rainfall does not exceed 0.2 mm
Dry spell	A period of 15 or more consecutive days on none of which 1.0 mm or more of rain falls
Daily or monthly	Monthly and annual means are easier to present in tables and graphs but a month with total rainfall of 20 mm could comprise an absolute drought and two days of 10 mm on each day

- Actual evapotranspiration was 38 billion m³ or 44% of precipitation in Ireland in 2017
- Evapotranspiration can be actual or modelled (Penman/Monteith formulae)
- Evapotranspiration models take into account solar radiation, air temperature, relative humidity, and air speed
- There can be substantial seasonal variation with highest levels in Summer
- An example seasonal graph is shown for Valentia station in Ireland (mm)





Flood Risk and Other Hazards

- Rainfall data can be used in combination with other data such as river gauge hydrological measurements and sea tidal information to monitor the risk of serious flooding along rivers and in coastal towns
- Insurance companies use flood risk assessments when deciding whether to insure premises by using calculations on the frequency that an extreme weather event may occur e.g. once in a hundred years
- Statisticians have the expertise to assist in calculating these exceptional events
- The seasonality of rainfall can be critical especially for agricultural crops
- Environmental agencies are equally concerned about low levels of water flow as it can result in an increase in the concentration of pollutants from wastewater inflows into rivers
- Flood risk often arises from rainfall over a period e.g. if the ground is soaked then rainfall will runoff more quickly into rivers and storm drains resulting in more rapid increases in river water levels or in incoming loads that exceed the capacity of waste water treatment plants
- Disturbances to ecosystems such as urban expansion, and removing wetlands and tree areas can also increase the amount of, and shorten the time interval of, rainwater entering rivers



Climate Data Rescue

- Met Eireann have computerised daily rainfall from 1941 and temperature and other data from 1960
- The CSO started a data rescue project with Met Eireann in March 2018 to rescue historical daily data back to around 1870 and to 1829 for one station
- Met Eireann scanned the images from original library manuscripts and CSO created excel templates, keyed the data, and are quality checking it
- It takes at least six hours for CSO to fully process one station month and we have keyed around 7,000 station months and fully checked around one-quarter of these



Conclusions

- Meteorological stations have huge amounts of very high-quality data that can be used at their actual frequency or can be summarised to monthly and annual levels
- The data collection stations must be nationally representative if you want to calculate monthly and annual national figures rather than monthly and annual station means
- The data can be used for compiling water statistics and in the completion of water accounts
- Statistical offices may be able to use their expertise in data processing to extend the national time series back beyond the 1970s when car ownership and foreign holidays took off! In Ireland's case the series is being extended from 60 to 130 years.
- The indicators can be absolute or relative to a base 30-year reference period



The next three slides give more information on our climate data rescue project which involves keying numeric measurements, weather symbols, and text data

Climate Data Rescue – Keying from manuscript....

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Climate Data Rescue – Quality Checking





